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ABSTRACT

Papers in this proceedings discuss and demonstrate the impact of emerging information technologies on the education process. Along with two general session papers and two poster session papers, the bulk of the document is comprised of papers offered in the five tracks of Technology and Pedagogy, Distance Learning, Library Support, Support for Faculty, and Technology-based Facilities. Papers include: Track 1: "Technology and the Three Stages of Teaching" (Pallas); "Data Acquisition Programming (LabVIEW): An Aid to Teaching Instrumental Analytical Chemistry" (Gostowski); "Developing Interactive Instructional Materials" (Henderson, Gold); "Prototype Expert System for Climate Classification" (Harris); "Simulating Professional/Client Interaction" (Pable, App); "Making Mathematics Come Alive with Technology" (Kimmins, Bouldin); "Use of Master Classroom Technology to Implement a Case Study Approach to Learning" (Draude); "The Critical Importance of Technology Integration in the Business School Curriculum" (Wade); "Enhancing Teaching and Learning in Higher Education with a Total Multimedia Approach" (Wells, Kick); "Putting the Sizzle Back into Computer Literacy" (Gazik); "Technology in Business Communication" (Rainey); "Beginnings: Introducing Computer Technology to Students in Speech-language Pathology and Audiology" (McErlain, Squibb); "The 21st Century Teacher Will Be Ready for the 21st Century Classroom. NOT!" (Sandoval); "InHealth's Student E-Conference: 'To 'Lurk' or To 'Chat'? That Is the Cyberspace Question'" (Schrader, Assante); and "Using Technology Resources To Teach World Theatre" (Jones, Boyd, Olson, and Duncan). Track 2: "Ethical Issues Relating to Teaching via an Interactive Two-way Television System (ITV)" (Thoms); "Faculty Development Programs in Interactive Television" (Cuffman, MacRae); and "Distance Learning: Technologies, Curriculum Development, and Teacher Education" (Wilson). Track 3: "Book It!" (Baird, Vesper); "Constructing Effective Search Strategies for Electronic Searching" (Flanagan and Parente); "The Electronic Journal on the Internet" (Kubly); and "Integrating Electronic Information Sources into the Curriculum" (Buchanan, Luck, Dulniak). Track 4: "Defining the Role of the Instructional Technologist in Higher Education" (Surry); "An Integrated/Multidivisional Approach to Instructional Multimedia Development" (Henderson, Gold, Tindall); and "Supporting Faculty's Development and Use of Instructional Technology" (Brace and Roberts). Track 5: "Teaching from the Desktop" (Johnson); "Instructional Labs: Pluses and Minuses" (Junaid); "The Instructional Technology Support Center at MTSU: Integrating Technology into K-12 and University Classrooms" (Schmidt); and "Master Classrooms at Middle Tennessee State University" (Roberts, Brace, and White). A workshop paper is "How to Participate in a Slow Revolution: The AAHE Teaching, Learning, and Technology Roundtable Program" (Gilbert). Poster session papers include: "Infotech Interactive: Increasing Student Participation Using Multimedia" (Baxter); and "Rhodes College and Opera Memphis Web Project" (Gray).

Proceedings of the 1996

Mid-South Instructional Technology Conference

March 31 – April 2, 1996

**Middle Tennessee State University
Murfreesboro, Tennessee**

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Proceedings
of the 1996

*Mid-South
Instructional
Technology
Conference*



March 31 – April 2, 1996

Middle Tennessee State University
Murfreesboro, Tennessee



Hosted by Middle Tennessee State University
and Southeast Missouri State University
In cooperation with the American Association for Higher Education

A Tennessee Board of Regents Institution

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 FA086-696

Proceedings of the 1996 Mid-South Instructional Technology Conference

These Proceedings comprise all papers submitted by conference participants; however, not all conference sessions are represented by a paper in the Proceedings.

Statements of fact and opinion are made on the responsibility of the authors alone and do not imply an opinion on the part of any of the conference committee, conference sponsors or their governing boards or legislative bodies, or any other conference participants. Although authors were provided with guidelines for preparation of camera-ready papers for the Proceedings, the final appearance of the papers is the sole responsibility of the authors.

Electronic versions of papers from the 1996 Mid-South Instructional Technology Conference are available on the conference World Wide Web site at <http://www.mtsu.edu/~itconf>.

For additional copies of these Proceedings, contact the Office of Information Technology, Cope 003, Middle Tennessee State University, Murfreesboro, TN 37132, phone (615) 898-5345, fax (615) 898-5720, e-mail oit@mtsu.edu.



Middle Tennessee State University

Middle Tennessee State University, an emerging major institution of higher education in the state, region, and nation, is a member of the State University and Community College System of Tennessee and is governed by the Tennessee Board of Regents. As a comprehensive university, it offers an extensive range of programs primarily serving students of central Tennessee while also attracting students nationally and internationally. The University provides quality educational programs in a supportive campus environment. An increasing emphasis on scholarship reflects a commitment to research and public service, activities which expand human knowledge and enhance the quality of life.



Southeast Missouri State University

Southeast Missouri State University is a multi-purpose regional institution of higher education that derives its authority from the people of Missouri through the Missouri State Legislature. While serving in the interest of the Nation and the State of Missouri, the University maintains a strong commitment to the diverse twenty-five counties of the rural, urban, and suburban areas of Southeast Missouri. As a multi-purpose institution, the University achieves its educational goals through the offering of instructional programs and other learning experiences at the certificate, associate, baccalaureate, master's, and specialist levels. Recognizing its responsibility for the advancement and transmission of knowledge and the preparation of leaders in all segments of society, the University provides a wide range of programs that address the intellectual, professional, personal, social, and cultural needs of students. The research, scholarly activity, and creative endeavor of faculty members, professional staff, and students alike are fostered as an integral component of the educational process.

Conference Planning Committee

Conference co-chairs: Lucinda Lea, Director, Office of Information Technology, Middle Tennessee State University, and Dennis Holt, Assistant Provost, Southeast Missouri State University.
Conference committee members: Sylvia Brace, Charlotte Hunt, Robin Jones, Gina Roberts, Connie Schmidt, and Donna White, Middle Tennessee State University; and Roy Ziegler, Southeast Missouri State University.

Mid-South Instructional Technology Conference

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INTRODUCTION

by Lucinda Lea
1996 Mid-South Instructional Technology Conference Co-chair

The first Mid-South Instructional Technology Conference simply grew out of the idea that innovative and quality educational technology endeavors were occurring in classrooms all across the Middle Tennessee State University campus. Why not promote and enhance the effort by bringing together a larger group of people throughout the region who are also achieving and accomplishing in this arena to share ideas and expertise?

Through a partnership formed out of the American Association for Higher Education (AAHE) Teaching, Learning, and Technology Roundtable program, Southeast Missouri State University and Middle Tennessee State University decided to sponsor such a conference as a team effort providing a stimulating environment for exploring new ideas and possibilities for teaching and learning.

University, college, community college, and K-12 faculty, librarians, and administrators came together to discuss and demonstrate the impact of emerging information technologies on the education process. Participants gained insight and shared knowledge in more than 40 concurrent sessions offered in the five tracks of Technology and Pedagogy, Distance Learning, Library Support, Support for Faculty, and Technology-based Facilities. Also offered were hands-on workshops, electronic poster sessions, and moderated discussion groups. A workshop conducted by Steve Gilbert, director of technology projects at AAHE, on starting a Teaching, Learning, and Technology Roundtable was a program highlight.

The keynote address delivered by Ben Shneiderman, professor in the Department of Computer Science and head of the Human-Computer Interaction Laboratory at the University of Maryland at College Park, focused on how post-TV media of computers and communications enable teachers, students, and parents to creatively develop education. Shneiderman also delivered the banquet address on the topic "Our Personal Responsibility for Shaping the Future."

Steve Gilbert's general session on "If It Takes Forty or Fifty Years, Can We Still Call It a Revolution?: Lessons for the AAHE Teaching, Learning, and Technology Roundtable" provided food for thought on the progress of technology-based instructional efforts on campuses across the country and the pace at which we can expect the change to occur.

These proceedings give a comprehensive view of the excellent presentations offered at the 1996 Mid-South Instructional Technology Conference. Dennis Holt, conference co-chair, and I thank all the attendees, presenters, and staff who made this first conference so outstanding and such a rewarding experience.



General Sessions



Mid-South Instructional Technology Conference



Engagement and Construction: New Strategies for Learning with Multimedia Digital Libraries

Ben Shneiderman

Head, Human-Computer Interaction Laboratory

Professor, Department of Computer Science

Member, Institute for Systems Research

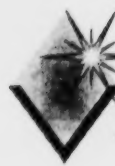
University of Maryland

College Park, MD 20742

<http://www.cs.umd.edu/projects/hcil>

The post-TV media of computers and communications - - including digital libraries, electronic mail, bulletin boards, word processors - - enables teachers, students, and parents to creatively develop education by engagement and construction. Students should be given the chance to engage with each other in short-term exercises and term-length projects, possibly situated in the world outside the classroom, with the goal of constructing a product that is useful or interesting to someone other than the teacher.

Multimedia digital libraries may empower students to be creative, but it takes teacher initiative to set goals, provide motivation, guide students, and evaluate process and product. This talk report on my personal explorations of the theory and practice in undergraduate and graduate courses. The potential and challenges of collaborative learning in an advanced Learning/Teaching Theater with 20 networked computers will be presented.



Engagement and Construction: New Strategies for Learning with Multimedia Digital Libraries

Ben Shneiderman

Head, Human-Computer Interaction Laboratory

Professor, Department of Computer Science

Member, Institute for Systems Research

University of Maryland

College Park, MD 20742



Serving the User - Beyond User Friendly

- ◆ Specify users and tasks
- ◆ Predict and measure
 - ◆ time to learn
 - ◆ speed of performance
 - ◆ rate of human errors
 - ◆ human retention over time
- ◆ Assess subjective satisfaction - questionnaire for user interface satisfaction
- ◆ Accommodate individual differences
- ◆ Consider social, organizational & cultural context



Education by Engagement and Construction

One must learn by doing the thing. For though you think you know it You have no certainty until you try.

♦ Sophocles, *The Women of Trachis*

What then is the purpose, the goal of education? A large part of the answer may well be what men of this civilization have longest feared and most desired: the achievement of moments of ecstasy.

♦ George Leonard, *Education and Ecstasy*, 1968



Education by Engagement and Construction

People want to:

- | | |
|------------|---------------|
| ♦ create | ♦ communicate |
| ♦ plan | ♦ help |
| ♦ explore | ♦ build |
| ♦ discover | ♦ participate |
| ♦ initiate | ♦ collaborate |

Sage on the Stage

vs..

Guide on the Side

Preferred over:

- | | |
|--------------------|--------------------------|
| ♦ acquiring facts | ♦ accessing information |
| ♦ drill & practice | ♦ listening to lectures. |



Education by Engagement and Construction

Emphasize creative construction of ambitious projects:

- ◆ Writing (poems, plays, essays, novels, newspapers, diaries)
- ◆ Drawing (pictures, logos, portraits, maps, birthday cards)
- ◆ Composing (music, songs, operas, hypermedias, videos)
- ◆ Designing (buildings, furniture, games, animations, family tree)
- ◆ Planning (class trips, vacations, parties, elections)



Education by Engagement and Construction

Service and collaboration:

- ◆ Engaging in the world (lobby a Senator, raise environmental awareness, call City Hall to report a problem)
- ◆ Helping where needed (teach computing to the elderly, improve recycling, increase awareness of drug abuse or AIDS)
- ◆ Caring for others (raise funds for the homeless, improve medical care)
- ◆ Communicating ideas (write to a newspaper editor, make a class speech, produce a cable TV show)
- ◆ Organizing events (prepare a bake sale or lecture series)



Education by Engagement and Construction

- ◆ In Class (small and large classes)
 - ◆ Think-Pair-Share
 - ◆ Roundtable
 - ◆ Three minute review
- ◆ Short-term team projects
 - ◆ Lab exercise
 - ◆ Show homework problem solutions
 - ◆ Present textbook chapter
- ◆ Semester-long team projects
 - ◆ Encyclopedia of . . .
 - ◆ Research project with publishable final report
- ◆ Distance Learning



Education by Engagement and Construction

Principles for Good Practice in Undergraduate Education

- ◆ Encourage Student-Faculty Contact
- ◆ Encourage Cooperation Among Students
- ◆ Encourage Active Learning
- ◆ Give Prompt Feedback
- ◆ Emphasize Time on Task
- ◆ Communicate High Expectations
- ◆ Respect Diverse Talents and Ways of Learning



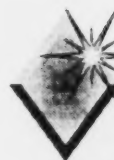
Education by Engagement and Construction

Conditions for Excellence in Undergraduate Education

1 Student Involvement

"Active modes of teaching require that students be
inquirers - creators, as well as receivers of knowledge."

- ◆ involving students in faculty research projects
- ◆ encouraging internships
- ◆ organizing small discussion groups
- ◆ requiring in-class presentations and debates
- ◆ developing simulations
- ◆ creating opportunities for individual learning projects



Education by Engagement and Construction

Conditions for Excellence in Undergraduate Education, Continued

2 High Expectations

3 Assessment and Feedback

(Involvement in Learning: Realizing the Potential
of American Higher Education)

Final Report of the Study Group on the Conditions
of Excellence in American Higher Education, 1984)



Education by Engagement and Construction

- ◆ Start slowly and experiment
- ◆ Think through it carefully
- ◆ Notice your resistance
- ◆ Report your results
- ◆ Do it better the next time
- ◆ Face to face communication that is supportive
- ◆ Interdependence that is positive and ambitious
- ◆ Responsibility shared by all group members
- ◆ Social relationship and communications skills
- ◆ Time for systematic reflection and feedback

Adapted from Richard D. Solomon & Neil Davidson, 1990



Education by Engagement and Construction

Project orientation

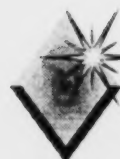
- ◆ Help an elementary school to improve computer use
- ◆ Teach elderly word processing
- ◆ Find or develop aids for a handicapped person
- ◆ Revise university policy on information protection
- ◆ Improve university administration, registration, . .
- ◆ Evaluate and suggest improvement to ATMs, library systems, voicemail, . . .
- ◆ Write guide for parents about kids' software
- ◆ Review workplace practices for computer users



Education by Engagement and Construction

Project management

- ◆ Coordinate efforts of team members working individually
- ◆ Schedule work and review work products
- ◆ Learn communication skills



Distance Learning Experience

Virtual Reality, Telepresence and Beyond - Fall 93 CS 790B National Technological University

- ◆ 3-credit 15-week one-way satellite TV Graduate Computer Science Seminar
 - ◆ 12 local students, 12 remote students (most with 2-7 day delay)
 - ◆ Intense interactions coordinated by e-mail
 - ◆ Ambitious team projects published on Mosaic
 - ◆ EVE: Encyclopedia of Virtual Environments
 - ◆ JOVE: Journal of Virtual Environments
- <http://www.cs.umd.edu/projects/hcil>



Distance Learning Guidelines

- ◆ Facilitate ease of access to needed technologies
- ◆ Promote sense of engagement
- ◆ Foster sharing of information
- ◆ Promote individual gratification

(Tonnesen, Barreau, McGoff & Eslinger, 1994
to appear Journal of Computers in Higher Education, 1996)



*How do we use the power of technology without
adapting to it so completely that we ourselves
behave like machines, lost in the levers and cogs,
lonesome for the love of life, hungry for the thrill of
directly experiencing the vivid intensity of the
ever-changing moment?*

Al Gore, *Earth in the Balance*, 1992

**Introduction to the
Teaching, Learning, and Technology
Roundtable Program**

Steven W. Gilbert
Director, Technology Projects
American Association for Higher Education

ABSTRACT

The American Association for Higher Education's Teaching, Learning, and Technology Roundtable (TLTR) program seeks to improve the quality and accessibility of higher education through the selective use of information technology and information resources in teaching and learning. This presentation introduces the TLTR concept and describes how to plan and implement a local TLTR. Through encouraging and developing institution-wide collaboration, local TLT Roundtables help institutions move beyond unilateral change through communication, coordination, and collaboration. Beginning with general guidelines such as asking fundamental questions and observing trends, this paper moves to specific guidelines for implementing a local TLT Roundtable including goals and methods, campus planning, first-year planning and organization, the structure of meetings and information input/output, the use of subcommittees, change strategies, and "advanced" topics for TLT Roundtables.



Teaching, Learning, and Technology Roundtable (TLTR) Program

Steven W. Gilbert

Introduction to the Teaching, Learning, and Technology Roundtable Program



MTSU/SMSU
April 2, 1996

Steven W. Gilbert
Director, Technology Projects
American Association for Higher Education

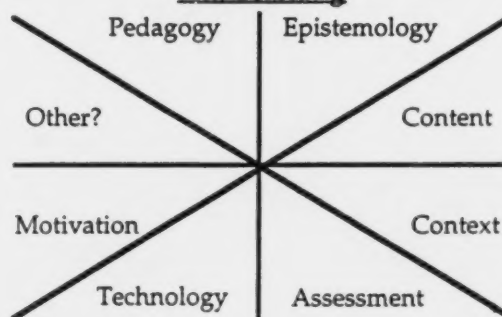
Overview

- Background, Obstacles [Excerpts], Q&A
- Exercise #1, Q&A
- 12 Recommendations
- Break?

Overview (cont.)

- Introduction to AAHE TLTR
- Exercise #2? Break?
- Q&A
- Commercial AAHE TLTR Resources, Events
- Evaluation/Suggestion Sheet

Key Elements for Improving Teaching and Learning



Obstacles (cont.)

- Underestimating difficulty of faculty adoption of **COMBINATIONS**
(Teaching Approach/Application of Info Tech/Instructional Materials -- New Ideas & Behaviors)
 - No Models
 - Arms' Length Access to Hardware
 - Faculty Reward System

Misinformation, Misimpressions, Misunderstandings

- If everyone is behind, who's ahead?
- Expectations/Hopes/Fears
≠
Resources



Teaching, Learning, and Technology Roundtable
(TLTR) Program
Steven W. Gilbert

Mis... (cont.)

"Anybody, Anytime, Anywhere"

- Desirable: Access to Information
- Misleading:
 - Access $\neq$ Education
 - Focuses too narrowly on individuals' self-interest
 - Ignores power, attraction of group experience
 - Further undermines crumbling communities

Fundamental Questions
Exercise

- For each of the following questions, first write answers individually (1 or 2 minutes),

then discuss in groups of 2-4 people.

Warm-Up

- a) Recall one of your own most valuable *learning* experiences. Describe it *briefly*.

Warm-Up (continued)

- b) Recall one of your own most satisfying *teaching* experiences. Describe it *briefly*.

Exercise (cont.)

Through the
Inevitable
Transformation
of Education...

Exercise (cont.)

- I. What are 1 or 2 important results that you most want to gain from educational uses of information technology?

- A. For yourself?
B. For your institution?



Teaching, Learning, and Technology Roundtable
(TLTR) Program
Steven W. Gilbert

Exercise (cont.)

- II. What do you most cherish and want not to lose (for your institution)?

13

12. Recommendations

[See Change Magazine
March/April, 1966]

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1. Fundamental Questions (cont.)

- Which combinations of face-to-face meetings, independent work, and telecommunications are best... for what?
How can information technology help most effectively?

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Exercise (cont.)

- III. What are 1 or 2 of the most important remaining obstacles (with respect to I and II) and how can you reduce them?

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1. Keep Asking
Fundamental Questions
Through the Inevitable Transformation
of Education...

- What do you most want to gain?
-For yourself? For your institution?
- What do you most cherish and want not to lose?
- What are the remaining obstacles and how can you reduce them?

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2. FUTURE, VISION

- Observe Trends
- Shape the Future
- Build a Vision.

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Teaching, Learning, and Technology Roundtable (TLTR) Program

Steven W. Gilbert

2. Shape Your Future (cont.)

- Make Technology Serve Your Mission & Values (ETHS)
- "An institution is inseparable from its people and its values."

[Future Faculty Task Force Report, Lane Community College, Fall, 1995, p. 4]

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3. Adjust to New Pace, Depth of Change ...as a Permanent Condition

"...the operational definition of eternity is 18 months, ..the length of a product cycle."

-[Harry Wilker, Creative Director, Broderbund Software, NYT, 9/11/95, p. D7.]

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Long-Term Aspirations/Expectations

- Quality, Accessibility Gains
- Productivity Gains??
-Unrealistic Expectation: Save money soon
- Build *Collaborative Teaching/Learning Communities*??
- Increase Societal Investment in Education???

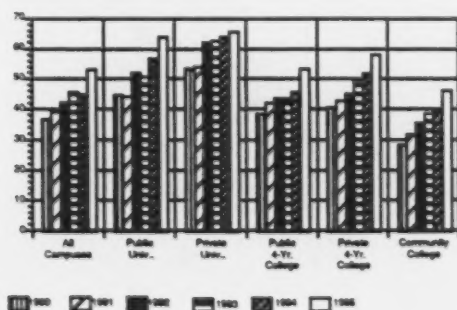
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Faculty Already Changing

- "It's not working as well any more."
- "Now I *can* do what I always knew I should."

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Faculty Ownership



23

Students Already Changing

- 20-35% students don't buy required textbooks -- new or used
[Ask your bookstore manager!]
- Students (& Faculty) with disabilities % increasing (more expecting assistance)

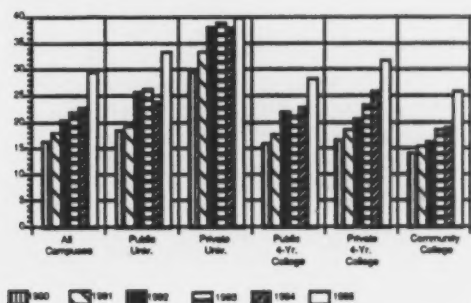
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Teaching, Learning, and Technology Roundtable (TLTR) Program

Steven W. Gilbert

Student Ownership



25

BUT...

- The vast majority (75% ± 10%) of undergrad education is "traditional"
- Lectures, teachers leading discussion
- Students reading textbooks

26

4. JUDGMENT, REDUCTIONISM, TRUST

- Use Judgment
- Resist Reductionism
 - Over-Quantification
 - Over-Audio-Visualization
- Trust Faculty and Students.
 - Evidence that could get people to reject word processing?

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5. Reject Dichotomies -- Use Combinations ["Just Say NO" to Dichotomies!]

- Old vs. New
- Distance Education vs. Classroom Discussion
- Teacher Centered vs. Learner Centered

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5. Find Good Combinations (cont.)

- Teaching Approach + Technology + Materials + Facilities + ...
- Face-to-Face + Alone + Telecommunications
 - Why are we here together today?

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5. Find Good Combinations (cont.)

- Electronic Mail & Instruction
 - Explosion '95, '96, '97?
- Collaborative Learning & Groupware

30

6. INTELLECTUAL PROPERTY, FAIR USE

- Understand Intellectual Property Law
- Help Keep "Fair Use".

31

7. GUIDELINES, POLICIES

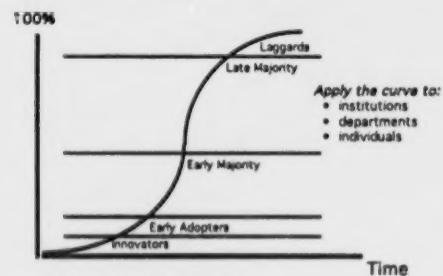
- Develop Guidelines Quickly, Policies Slowly for New Environment
 - Internet
 - Disabilities

32

8. ~~Avoid~~ Prepare for Your Support Service Crisis

33

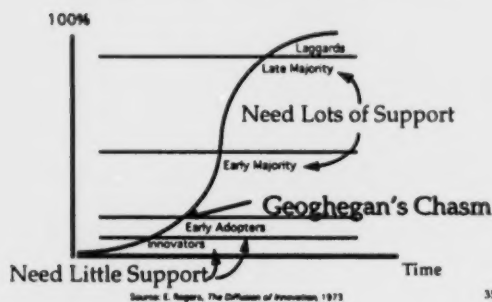
The Diffusion of Innovation



Source: E. Rogers, The Diffusion of Innovation

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The Diffusion of Innovation



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Common Campus Crisis

- "Hardware meteor hits campus!"
- Epidemic of software upgrades, updates, viruses
- "Feature Bloat"
- Rampant use of EMail, Internet, WWW!

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Supporting Transition is
Harder

- Must Support Old and New
- [Transition May be Permanent!]

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It's not only *technical*
support!

- For more advanced, *deeper*, uses of information technology to improve teaching and learning...
- Need *combination of support services*: technical, library, faculty development, *et al.*

38

Things may get worse before
they get better!

- Expanding technology base
- Increasing faculty, student interest
- Hard to fund support staff
- INCREASING DEMAND,
DECREASING SUPPLY...

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9. EXTEND STUDENT
ROLES

- Use Students as Assistants
- Form FSSSTs
- Learning Colleagues & Learning Communities

40

10. PORTFOLIO OF
CHANGE STRATEGIES

- Develop a Portfolio of Change Strategies

41

11. REALISTIC
EXPECTATIONS: MORE
TIME, MONEY

- Invest More Time and Money.
- Re-Focus Resources on Improving Teaching and Learning (with Information Technology)

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12. INSTITUTION-WIDE COLLABORATION

- No institution can afford *all* attractive options
- No individual faculty member can know/find *all* teaching options
- Develop Institution-Wide Collaboration to Improve Teaching and Learning.

How? Form Local TLT Roundtables!

- Move Beyond Unilateral Change:
Communicate, Coordinate, Collaborate
- Exchange Information with National Peers, Regional Neighbors

DeFragmentation Planning, Policies, Support Services



A Local TLT Roundtable -- GOALS

- Improve Teaching & Learning Widely/Deeply
- Via (Cost)Effective Integration of Information Technology

A Local TLT Roundtable -- GOALS (cont.)

- Make Technology Serve Institutional Mission, Individual Values
- Pioneers Excited, Mainstream Engaged, Laggards Respected

A Local TLT Roundtable -- METHOD

- Inclusive, Collaborative
- High Influence, Low Authority
 - Planning
 - Advice
 - Forum
 - Implementation



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AAHE TLTR GUIDELINES: INCLUSIVE CAMPUS PLANNING

- 2 Categories of Faculty
- 4+ Service Organizations
 - Computing, Library, Faculty Development, Bookstore
- Chief Academic Officer
- Student Views Available
- Inter-Institutional Information Exchange
- Long-term Commitment

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TLTR 1st Year Planning/Organization

- Members
 - Help Understand Trends
 - Support Change Process
 - "Early Majority" Faculty
 - Students?
- Chair, Co-Chair? Vice Chair?
 - Academic, Administrative, Technical

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TLTR Meetings & Info Input/Output

- Schedule
- Ritual -- Faculty Presentations
- Location -- Rotate
- Open Meetings?
Invited Guests?
- Newsletter? On-Line?

33

AAHE TLTR Approach (Cont.)

Understand, Respect Local Culture (& Local Politics)

30

TLTR 1st Year Planning/Organization (cont.)

- Articulation with Other Groups
 - Inclusivity! Include Reps
- Advisory? To Whom?
 - Authority?
- Support Staff
 - None or Very Modest
- Operating Budget
 - None or Very Modest

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TLTR Sub-Committees

- Chairs
- Members
- Schedules, Tasks
- Sunsets

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Teaching, Learning, and Technology Roundtable (TLTR) Program

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TLTR Sub-Committees (First Year??)

- Info Collection & Exchange
- Faculty Support Services
- Distance Education
- Strategic Planning & Institutional Culture
- Evaluation & Assessment
 - Educational Impact of Info Tech
- [Care for Wounded -- Non-Recipients]

55

TLTR Sub-Committees ("Advanced"??)

- Student Assistants, Fees, FSSSTs
- Regional Activities
- Departments & Disciplines
- Faculty Roles & Rewards
- Vendor Interface

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TLTR First Year Task

- Information Exchange (Faculty/Student Support & Good Practice Directories)
 - Resources
 - Services
 - Successful Practice
 - TLT Combinations
- DON'T MAKE IT PERFECT!
- Paper/Electronic
- [Link to National]

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Local TLT Roundtable -- "Second Year" (?)

- Developing Portfolio of Strategies to Change Curriculum & How People Teach/Learn

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AAHE TLTR Planning Grid (excerpts: Narrow to Wide)

- "Wide" = high % of faculty, students
 - Sequence of Courses
- "Narrow" = low % of faculty, students
 - One Full Course
 - Several Topics in One Course
 - One Topic in One Course

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AAHE TLTR Planning Grid (cont.) (excerpts: Shallow to Deep)

1. Increase Personal & Institutional
PRODUCTIVITY (60%==>70%)
2. Enhance Current
TEACHING (10%==>25%)
[Instructional Bottlenecks]
3. Change
PEDAGOGY (5%==>10%)
4. Change CONTENT &
EPISTEMOLOGY (2%==>5%)

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Examples of Change Strategies

- Narrow/Deep
- Wide/Shallow
- Moving Toward
Wide/Deep

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Student Assistants (Wide/Shallow?)

- Student Assistants to:
 - Faculty, Peers, K-12 Teachers
- Training and Supervision
 - Technical, Pedagogical, Service Style
- Credit, Certification?
- Win-Win
 - Increase Educational Use of Information Technology
 - Reduce Support Service Crisis
 - Save Money for Institutions
 - Career Preparation for Students

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FSSSTs:
Example which can Grow
from Narrow/Deep to Wide/Deep

(Faculty-Student Support Service
Teams)

63

Narrow/Deep Strategy

- [Geoghegan's Departmental
Faculty Peer Support
 - Personable/Missionary
Early Adopters
 - Select a Few Departments
 - Two-Year Start-Up Funding

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Narrow/Deep Strategy: Faculty Grants Program

- Internal Faculty (Support)
Grants
- \$ + Release Time + FSSST Time
- Favor Pairs of Early Adopters/
Early Majority
- Favor Full Departments

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Wide/Shallow Strategy

[Ben Schneiderman, U. Md.]

What if every course began with:

- Class Roster On-Line
[With Video Images?]
- Syllabus On-Line
(including required & recommended
course materials) via CWIS?
- EMail Account for Every Student
(& Faculty Member)
Comfortably Accessible Daily
- Course Listserv Ready

66



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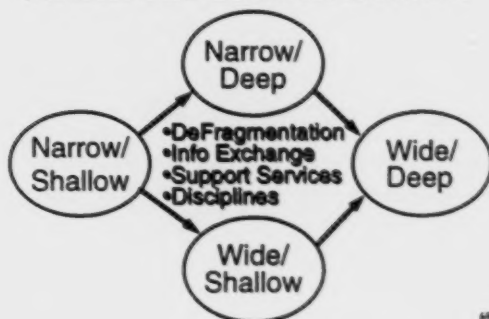
AAHE TLTR "Advanced" Topics

- Regional TLTR Activities
 - Inter-Visitation Trios
 - Regional Events -- "Good Practice"
 - Regional Events -- Intro to TLTR, "Start-Up Workshop"
- Connecting with Departments, Disciplines
- Faculty Roles & Rewards

AAHE TLTR Advanced Topics (Cont.)

- Vendor Interface
- Linking Local Directories: TLTR InfoSource
- Student Fees

AAHE TLT Local Roundtable



Exercise: Categories, Representatives

- I. List titles and/or names of those who can best help *understand trends* in teaching, learning, and technology for your institution.

-Circle three who are especially essential.

Exercise: Categories, Reps (cont.)

- II. List titles and/or names of those who are needed to help *support faculty* efforts to change teaching and learning (with information technology) at your institution. [Include those needed to change and implement policies about faculty roles and rewards.]

-Circle three who are especially essential

Exercise: Categories, Reps (cont.)

- III. How often do most of the people listed above meet together to discuss ways in which faculty and students can be helped to use information technology to improve teaching and learning? What is keeping your institution from holding such meetings regularly and effectively?



Teaching, Learning, and Technology Roundtable (TLTR) Program Steven W. Gilbert

AAHE Events

•Regional TLTR Workshops

- Introductory (1/2 day)
- Start-Up (1.5 day) TEAMS
- Contact Ellen Shortill
(202) 293 6440 ext. 38
SHORTILL@CLARK.NET

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TLTR Summer Institute
(July 12-16, 1996 Scottsdale, AZ.) (cont.)
TRACKS

- I. Institutional Planning,
Resources, and Support Services
- II. Changing Faculty and Student
Roles -- and the Curriculum
- III. Education, Technology, and
the Human Spirit
- IV. Assessment, Evaluation, and
Research

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TLTR Summer Institute
(July 12-16, 1996 Scottsdale, AZ.) (cont.)
"Good Practice"

- Students as Assistants
- Underprepared Students
- Distance Education
- Collaborative Learning
(Problem Solving, Projects)

77

AAHE Events (cont.)

- 2nd Annual
TLTR Summer Institute
- "Strategies for Change"
- Scottsdale Princess -- Scottsdale,
Arizona
- July 12-16, 1996
- [Teams & Individuals]

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TLTR Summer Institute
(July 12-16, 1996 Scottsdale, AZ.) (cont.)

"Good Practice"

- Change Strategies and Local
TLT Roundtables
- Cost-Effective Educational Uses
of Information Technology
- "Waiting for the Infrastructure"

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TLTR Summer Institute
(July 12-16, 1996 Scottsdale, AZ.) (cont.)

- TLTR Team Work
Beginning, Advanced
- Individuals
Higher Education
Information Industries

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Teaching, Learning, and Technology Roundtable
(TLTR) Program
Steven W. Gilbert

Subscribe to LISTSERV
AAHESGIT
Send message to

LISTPROC@LIST.CREN.NET

"SUBSCRIBE AAHESGIT
YOURFIRSTNAME
YOURLASTNAME"

Check the AAHE (TLTR)
WWW Site

- <http://www.ido.gmu.edu/aahe/Welcome.html>
- Copy of Steve Gilbert's Recent Presentation Slides(?);
- Other AAHE Info;
- Other TLTR Info



Photo Gallery



Mid-South Instructional Technology Conference



Mid-South Instructional Technology Conference

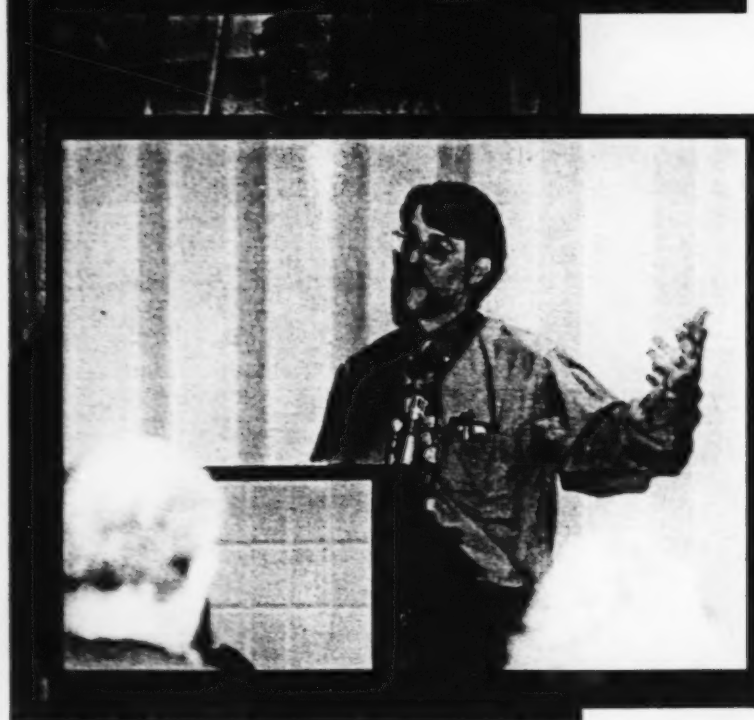
Photo Gallery 1996



Did you learn anything at the conference that may affect the way you do things at your institution?

“

create a TLT Roundtable to coordinate the various technology activities on campus, plus create some new ones



classroom techniques to increase student learning

confirmation of direction we want to take and determination to fight for a clear plan that includes faculty development and support

”

Mid-South Instructional Technology Conference



Photo Gallery 1996

Did you learn anything at the conference that may affect the way you do things at your institution?

“

lots of ideas to investigate implementation at home institution

motivation to implement new technologies in classroom

peer interaction built bridges and crossed chasms that are impossible through e-mail or phone interchanges

use of World Wide Web pages to supplement courses

”



BEST COPY AVAILABLE

Mid-South Instructional Technology Conference

Photo Gallery 1996



Did you learn anything at the conference that may affect the way you do things at your institution?

“

valuing learning in choosing and implementing technology

I now know which hardware and software I need to accomplish my goal

use of e-mail for student communication/ assignments

the conference gave me a more comprehensive view of my role in pushing technology forward at my university

”





Track Sessions



Track 1: Technology and Pedagogy General



Mid-South Instructional Technology Conference



Technology and the Three Stages of Teaching

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Abstract

The beginning teacher's question "How can I survive this semester?" becomes "How can I do what I am presently doing better?" It is at this stage that many instructors see technology fitting in as they take an existing curriculum and use different tools to teach the same things. There is a third question, however: "What am I really trying to do?" And it is this question that directs the excellent instructor to examine curricula with the goal of achieving specific results through technology use in instruction.

Technology and the Three Stages of Teaching

As technology becomes more and more pervasive in the educational environment, it is important to understand the position in which teachers find themselves as this technology is introduced. Technology is the "wave of the future" - except the future is now. According to Terry O'Banion, the "potential for creating real change [comes from] the application of information technology to the teaching equation" (O'Banion, 1994). The way in which teachers use technology in their instruction is often a function of their educational and technological background, together with their previous teaching experience. It also depends heavily on the amount of attention the instructor pays to the true goals of his or her course.

What are the Three Stages of Teaching?

The beginning teacher is typically overwhelmed by a teaching load of four or five classes, one or more preparations, and the responsibility of being wholly responsible for both content matter and student learning. Typical questions this new instructor asks are, "How can I survive this day?", "How can I survive this semester?", and "How can I cover all this material in the time allotted?" The instructor at this stage typically has hand-me-down course curricula and outlines, perhaps even copies of tests given by others in the department. This instructor may modify some or all of these materials in the process of developing his or her own syllabi, but often does not have the luxury of examining the individual course in the context of the entire curriculum. Relying on the same methods used when he or she was a student, frequently one-way communication with a minimal amount of technology, the instructor may use technology in small ways. Bloom's taxonomy in the cognitive domain and Kratochwill's taxonomy in the affective domain are little contemplated, let alone consciously applied.

In general, it is not until the second or third semester of instruction that the instructor enters the second stage of teaching. At this point, some introspection occurs with the question, "How can I do what I am doing better?" Comfortable with the basic outline of what is being taught, he or she begins to start looking around for ways to improve the method of delivery. A speech teacher, for example, may use audio and/or video clips of Winston Churchill when discussing persuasive speaking. An art instructor may use a laser disc containing slides of different masterpieces in an art appreciation class. Of course, this laser disc may only be an improvement over the 35 mm slide cassette previously used; the instructional technology is merely supporting the same instructional goals that may have been popular for 20 or more years. Again the taxonomies are frequently ignored, though perhaps not as much as by the new instructor.

Unfortunately, many instructors remain at this second stage, improving their delivery of a curriculum not necessarily appropriate to the current student. Most instruction is still done by the lecture method, with students expected to work on assignments individually, but more and more the graduate is expected to collaborate with others in solving problems. And it is not only the instructors who fall into this trap, it is administrators as well. Elliot Eisner wrote,

Consider for a moment school architecture and the design of school furniture. Most school rooms are designed as cubicles along corridors and have a kind of antiseptic quality to them. They tend to be repetitive and monotonous in the same way that some hospitals and factories are. They speak of efficiency more than they do of comfort...Schools are educational churches, and our gods, judging from the altars we build, are economy and efficiency. Hardly a nod is given to the spirit. (Eisner, 1979)

It is now that we need to look at the most important question, one which the excellent instructor asks: "What am I trying to accomplish?" It is only when this question is asked and answered that the role of technology in the classroom can take on true meaning, because it is within this framework that technology can be at its most effective. The taxonomies of Bloom and Kratochwill, in the cognitive and affective domains, respectively, need to be examined. Although technology can be used at all levels, it may not be the most effective approach.

As an initial example, Bloom's taxonomy begins with knowledge, defined as the remembering of previously learned material. This may be taught using technology, perhaps as a presentation of facts or via drill using a computer. Some of the earliest applications of technology in the classroom took place here, and many elementary classrooms still use computers for this purpose. But is this the best use of the technology? The answer to this question lies in the curriculum.

What is the Curriculum?

Curriculum has been defined as all the experiences offered to learners under the auspices or direction of the school. Under one interpretation of curriculum, there are five perspectives, all of which are valid when viewed with regard to technology. The first of these, the *ideal* curriculum, is that large body of knowledge as perceived by experts in the field. More and more of this information is becoming readily available to instructors via the internet, and faculty have great difficulty keeping up with all of it. Institutions make some decisions concerning which part of this body of knowledge they will provide to their students. The result of this decision, in a structured form, is the *formal* curriculum. At the next level, the faculty member determines which part of the formal curriculum is his or her responsibility; this is known as the *perceived* curriculum. Not everything identified in the perceived curriculum is taught; some things are excluded, other items not originally in the perceived curriculum are included. The result, what the instructor actually teaches, is the *operational* curriculum. Finally, what the student actually learns is not what the instructor actually teaches. What the student learns, which will be a function of many more things than just the classroom happenings, is the *experiential* curriculum.

Another interpretation, which overlays the above perspectives, is that the curriculum consists of three parts. The *explicit* curriculum is identified as what is consciously being taught. This includes course content, materials, knowledge, and applications. The *implicit* curriculum is that information which is conveyed to the students as part of the

classroom experience. This has major implications in the students' perception of their education. If an instructor insists on attendance and punctuality, legible papers and attentiveness in class, then the student perceives this as an important aspect of the course, and perhaps, the discipline. Also a part of this heading is the means by which an instructor delivers his or her material. If technology is not a part of the curriculum, either by explicit use by the instructor or by requirements for the student to use technology as part of his or her assignments, then the student may perceive that technology is not important in that field.

Just as important, and a major consideration as we attempt to put more and more content into a fixed time frame, is the third part of the curriculum. This is known as the *null* curriculum, which is that part of the body of knowledge which is consciously not taught. One of the major arguments by faculty against adding the use of technology to their courses is that there is insufficient time to incorporate technology together with everything else. The answer to this is, again, to ask and answer the question raised at the third stage of teaching, "What am I trying to do?"

Begin with the End in Mind

According to Stephen Covey, author of *The Seven Habits of Highly Effective People* and *First Things First*, the answer to the third stage question is "Begin with the end in mind" (Covey, 1989). What are the cognitive and affective goals being sought? What are the best ways of achieving these goals? In the cognitive domain, in increasing order of cognition are knowledge, comprehension, application, analysis, synthesis, and evaluation. Is the faculty member satisfied with mere knowledge or comprehension, or are application and analysis more desirable? The use of technology will depend on the answer. As an example, take an introductory electric circuits class. For a circuit with an alternating current power supply and reactive components, the circuit response will be a function of the frequency. Calculations in this type of circuit can be long and tedious, and if time is spent requiring students to perform calculations, little else is accomplished other than verifying that the student is capable of performing the calculations. If the goal is knowledge and comprehension, this instruction is appropriate and no additional technology is indicated. If, however, the goal is to analyze this same circuit, the use of a software package such as Pspice, which allows rapid calculation of voltages and currents, is indicated. The student can then be asked to vary parameters and determine the effect of such variance, thus appropriately using this as an analysis tool. A similar discussion can occur in the affective domain.

Implications and Conclusions

The significance of this discussion is that faculty and administrators need to be taking the time to analyze curricula, before spending money on technology. Unless there is a satisfactory answer to the question, "Why am I using this technology?", it should not be used. This does not, however, justify ignoring technology because it is more convenient not to explore its benefits in the classroom. The converse question, "Why am I not using technology?" should also be asked and answered. Faculty should be given the opportunity to carefully analyze their goals, and administrators should reward those who make

appropriate efforts to hone and justify their materials. Steven Kerr writes of the disincentive system common in universities, stating "Society *hopes* that teachers will not neglect their teaching responsibilities but *rewards* them almost entirely for research and publications" (Kerr, 1975).

We now have the capability of accessing extraordinary amounts of data, almost immediately as it is generated. Our challenge is no longer getting information, it is analyzing the information we get and determining which information we need. As Steven Eskow, founder and president of the Electronic University Network, has said, "Technology needs to be state of the mind, not state of the art." It is only when we realize this, and apply it in the classroom and across the curriculum, that technology will take its rightful place in education.

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Track Sessions



Track 1:
Technology and Pedagogy
Basic and Applied Sciences



Mid-South Instructional Technology Conference



**Data Acquisition Programming (LabVIEW):
An Aid to Teaching Instrumental Analytical Chemistry**

Rudy Gostowski

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Clarksville, TN 37044

ABSTRACT: Chemists often setup, troubleshoot, repair and construct the instruments they use in measurements. For a student, the first experience in "looking under the hood" of an analytical instrument can be quite intimidating. To overcome this fear of the unknown, a course offering an opportunity for hands-on experience with the essential components of modern instruments has been developed. The objective of the course is to provide students with the skills necessary to construct a simple model instrument. Central to these activities is the data acquisition language LabVIEW (National Instruments, Austin, TX).

**Data Acquisition Programming (LabVIEW):
An Aid to Teaching Instrumental Analytical Chemistry**

**Rudy Gostowski
Austin Peay State University
Clarksville, TN 37044**

Chemists often setup, troubleshoot, repair and construct the instruments they use in measurements. For a student, the first experience in "looking under the hood" of an analytical instrument can be quite intimidating. To overcome this fear of the unknown an opportunity for hands-on experience with the essential components of modern instruments is offered in the Advanced Instrumental Methods course at Austin Peay State University. By seeing how these parts fit into the overall scheme of an instrument, the student can better formulate strategies to test and correct malfunctioning equipment, to modify instruments for a particular purpose, or to construct an instrument not commercially available.

The primary objective of the course is to provide students with the skills necessary to construct a simple model instrument. These skills include the design and fabrication of electronic circuits and computer programming in a data acquisition (DAQ) language. LabVIEW (National Instruments, Austin, TX) was selected as the DAQ language for the course. As seen in the outline provided in Table 1, the course integrates many different subject areas such as: electronics, programming, and electrochemistry. Any of these areas considered separately would be too narrow for an undergraduate course, but as a unit they provide the tools necessary for understanding instrument design.

Table 1. Course Outline (One Semester, Four Credit Hours)

Basic Circuits
 Electronic Test Equipment
 Transistors and Operational Amplifiers
 Digital Electronics
 LabVIEW Programming Concepts
 LabVIEW Waveform Input/Output
 LabVIEW Data Storage and Processing
 Electrochemical Theory
 Voltammetry

Electronic Circuit Design

Introductory Concepts. The electronics portion of the course began with a review of the basics of electricity. The material quickly moved to integrated circuits since these devices permit the construction of useful circuits without extensive consideration of design parameters.

Electronic test equipment listed in Table 2 was provided at each laboratory station in a virtual form by means of a multifunction DAQ board and the graphical user interface (GUI) found in the software package (LabVIEW). In the strict sense, virtual instruments are computer programs. However, in a broader view, virtual instruments result from the combination of these programs with the appropriate DAQ board. These "virtual instruments" supply the same functions as their traditional counterparts. However, providing instruments in this format is a more cost effective solution than purchasing the individual instruments and provides greater functionality since data may be shared between various computer applications.

Table 2. Virtual Instruments Provided by LabVIEW Software and DAQ board

Logging Voltmeter
Strip Chart Recorder
Oscilloscope
XY Recorder
Function Generator
Electrochemical Instrument

Data Acquisition Programming

Fundamental Concepts. Data acquisition programming transforms a computer such as a desktop PC into a device to record, manipulate, and display data; to produce stimulating signals; and in some cases to control and manage the overall experiment. LabVIEW was chosen as the data acquisition program for the course because it facilitates fast program development, provides many powerful built-in functions, and has universal acceptance in research and manufacturing settings. It is a graphical language where the program is written by placing and connecting icons which represent various built-in and user-developed functions on a block diagram. The connection of icons results in data flow execution of program nodes. For these reasons LabVIEW is the program of choice for the collection and distribution of data in analytical experiments.

LabVIEW GUI. LabVIEW provides a built-in graphical user interface (GUI) or front panel. The similarity of the front panel to real instruments allows the development of virtual instruments (VI's) which may be given their own icons and then used in future programs. Students appreciate the graphical nature of LabVIEW and often remark that programming is enjoyable taking on the qualities of a video game.

LabVIEW Programming. Students received instruction in LabVIEW programming by a combination of lectures on and practice with the software. The examples found in the Tutorial manual (1) were discussed in lecture. These topics included: the front panel; the block diagram;

building a VI; arrays and strings; loops; case and sequence structures; charts and graphs; file input and output; data acquisition; and debugging. Students also worked through the "Getting Started" and "Example VI's" sections of the Data Acquisition VI Reference Manual (2) to gain experience in analog input and output; counter and timers; and digital input and output. Different strategies in data acquisition were discussed to determine which would be most appropriate for a particular analytical experiment. To better understand the procedure by which the processor of a computer handles multiple tasks, the operation of the priority scheduler was explained in terms of a queue and interleaving (3). Analytical instruments require the computer to manage multiple tasks and to utilize different schemes depending on the type of analysis desired. A logical approach to design of LabVIEW applications is the canonical VI (4). The canonical VI represents methods of organizing tasks into modules which may be combined to form the application. Some canonical VI's considered included the initialize, loop, and shutdown; independent loops; the client-server; menu driven and the state machine. These VI's provide a framework from which a particular application may be generated.

Waveform Generation and Acquisition for Electrochemistry VI. After the students had gained experience with LabVIEW programming they were presented with the following assignment:

Write a VI which outputs an array specifying the stimulating waveform and records two channels of data. The output and the input must start at the same time and continue until both are finished.

It soon became clear that by placing the start icons for both operations (array output and data recording) in one program sequence structure the two tasks would begin at the same time. However, the output data array must be loaded into the buffer and both tasks configured prior to the start icons. A wait icon would pause execution until all of the points in the output buffer were written. Since two channels of input were multiplexed the number of points acquired was twice the number generated. This scheme resulted in both tasks ending at the same time. An icon and a

connector panel were created which allowed this VI to be used in another program (Computer-Controlled Electrochemistry Instrument VI).

Computer-Controlled Electrochemistry Instrument VI. The final programming assignment placed the Waveform Generation and Acquisition VI within a program which would perform various electrochemistry experiments. This assignment was stated as follows:

Write a VI which will take a starting potential and a switching potential and generate a 1000 point array specifying a triangle wave for cyclic voltammetry experiments. Use a Ramp Pattern VI to generate an array describing a ramp for linear scan experiments. A third VI should be written which will take the starting potential, the switching potential, and the voltammetry scan rate (V/s) and determine the update rate for the Waveform Generation and Acquisition VI. Combine these VI's to produce an instrument which can accomplish cyclic voltammetry, linear scan, and stripping analysis experiments. Stripping analysis requires a timed electrolysis prior to a linear scan.

Two Ramp Pattern VI's were combined to produce a triangle wave. The starting potential was the initial value for one ramp and the final value for another. The switching potential was the final value for the first ramp and the initial value for the second ramp. Each VI produced an array of 500 samples. The two ramps were combined with a Build Array VI which yielded an array of 1000 samples. A second Build Array VI was used to convert the array into a two dimension array. However, this array only has elements in one column. A Transpose 2D Array VI was used to convert the array from a row major to a column major configuration as required by the AO Write VI. The update rate was determined by multiplying the absolute value of the difference of the start potential and the switching potential times the reciprocal of the voltammetry scan rate (V/s). This yielded the time period of the experiment in seconds. Dividing the number of updates by the period gave the update rate (updates/s) for a linear scan experiment. Dividing the linear scan update rate by two resulted in the update rate for a cyclic voltammetry experiment. The Electrolysis VI provided a timed electrolysis prior to any further voltammetry as required for

stripping analysis. It consisted of an AO Write One Update VI and a Wait VI. An artificial data dependency was created to a case structure which was used to select the proper stimulating waveform array for cyclic voltammetry, linear scan, or stripping analysis. This array was feed to the Waveform Generation and Acquisition VI along with the update rate and the scan rate from the Voltammetry Scan Rate VI. The output was displayed by using an XY Graph front panel indicator or could be saved to a file.

Recent Developments

Since the completion of the Fall 1994 class, two new developments have occurred which will enhance the future effectiveness of the course (5). Prentice Hall is offering a student edition of LabVIEW with an accompanying user's guide (6) and a computer interfacing and LabVIEW programming textbook (7) has been developed. This will permit students to have their own copy of LabVIEW to work with. The guide and textbook will provide more formal routes to learning programming skills.

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Developing Interactive Instructional Materials: A Model
Mid-South Instructional Technology Conference
Middle Tennessee State University
April 1, 1996

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Abstract

Many colleges and departments at Tennessee Technological University, as well as most other major universities, are progressing toward more interactive instructional materials. Clearly, the benefits of implementing instructional technology are numerous and diverse. However, because of increasingly austere budgets, a focused and cost-effective approach to implementing multimedia in the classroom is required. This paper summarizes a methodology for creating multimedia instructional tools by first initiating a functional model and then expanding the model into other areas.

UNIVERSITY CHALLENGES

In today's university environment, too many demands are being made for assistance with too little money being spent on equipment and support personnel. However, there is clearly a need to put "technology" into instruction at Tennessee Technological University. In trying to convey difficult and complex concepts -- particularly in engineering and the sciences -- multimedia tools provide a mechanism for augmenting the standard approaches. The concept is to improve teaching and therefore maximize the probability that learning will take place. Recruitment/retention demands are making the need for technology apparent to our clientele (both students and faculty). For example, high school students are more likely to have been exposed to technology before coming to Tech and, when searching for a college, it is becoming common to use the World Wide Web. Furthermore, with decreasing funds, there is not enough personnel or equipment to support duplication of effort in the production and maintenance of educational materials. As a result, there is more demand to justify costs involved in instructional material development. Developing single instructional solutions that aren't applicable to other disciplines are not cost effective and are unacceptable.

ANSWERING THE CHALLENGES

Many of the new grants available to professors have a technology component. Also, many of the same methods, skills and expertise needed for one project are applicable to many similar projects. This concept was utilized in a partnership between the Department of Civil and Environmental Engineering, the Educational Technologies Center, and the D.W. Matson Computer Center at Tennessee Technological University. These three organizations combined to create an instructional product to be used in the civil engineering classroom to teach classes such as Structural Dynamics, Vibrations, and Seismic Design. The multimedia tool is called an Interactive Seismic Database (ISD) and is intended to allow students to interactively research earthquakes and seismic engineering topics. This tool is also being used as a model for other instructional multimedia tools such as the Computer Science 110 project, intended to interactively test students and thereby reduce faculty load.

THE MODEL

Concepts in Engineering -- particularly seismic concepts in Civil Engineering -- are very graphically oriented and complex. Students often have difficulty understanding and retaining difficult three-dimensional information when presented in two-dimensional space. The National Science Foundation has provided funds for development of the National Engineering Education Delivery System (NEEDS). This program and others have demonstrated that

the use of multimedia techniques consisting of the full range of graphical materials (i.e., interactive software modules, video segments, pictures and graphics, outlines and text) provides an environment most conducive to learning (Saylor 1992 Gay 1994). Thus, an interactive seismic database is being created (funding pending from the National Science Foundation) to store seismic information (e.g., damage photos, seismographs, reconnaissance information, etc.) and convey it more effectively in a classroom environment.

For example, seismic codes have specific provisions regarding geometric or vertical irregularities in buildings. These irregularities might induce torsion in a structure due to unsymmetrical building shapes. The conveying of this concept is very important in the context of seismic design or structural dynamics. Yet it is extremely difficult to convey on a blackboard. The Interactive Seismic Database may be used as a tool by the professor to demonstrate --using actual damage photographs -- the importance of avoiding these geometric or vertical discontinuities in structures. Also, similar structures that responded differently to a seismic event can be studied. Likewise, the students could be assigned the task of using the ISD to investigate damage resulting from torsional forces on irregularly shaped structures and provide methods of construction that could have been used to prevent the damage. In this way the student begins to understand the theory of structural dynamics, the principles behind code restrictions, and the ramifications of their decisions on real buildings.

CREATING THE MODEL

It should be noted that this model is not just a piece of software. It is a process through which other major multimedia projects will be developed. The process begins with a faculty member who has an idea for such a project. Campus committees composed of faculty and administrators decide if the project is a worthy one and determine its priority based on other on-going projects. Such committees may also assist with funding for the project if it is not externally funded.

The next step is to formulate a team of experts to assist with the project. Faculty experts in the field determine objectives and content. The Academic Computing Support Manager advises on the instructional layout of the project as well as on the file structure, hardware, and software to be used. The Educational Technologies Center then begins the multimedia design of the project. These experts have an on-going dialogue. No one's ideas are tossed out without due consideration by all involved. As portions of the project begin to unfold, skilled student workers in the Educational Technologies Center do most of the actual programming, debugging, and general labor associated with the project.

BENEFITS OF THE MODEL

This model makes use of existing expertise on campus while allowing outside resources to be utilized. Cooperation among many departments and services within the University is required for most projects. This cooperation helps avoid duplication of personnel and expensive specialized equipment in a financially challenged environment. The team approach, especially with the cooperation of Academic Computing and the EdTech Center, means that there are few points of contact for all projects. Faculty with ideas can contact any of two or three people to get the project initiated.

Using this team-approach lends itself well to efficiency in programming. Many applications will use the same basic building blocks: questions and answers, either multiple choice or written; interactivity in the form of clicking buttons, hot spots, or hypertext; database searches; testing and the scoring of those tests; and branching to other modules or executables. Once these modules are written, only minor changes to the graphical "front end" is needed to use the same module in many applications.

This model also helps as a way of getting the equipment necessary for a project. No single department or unit on campus can afford all the specialized equipment needed (and the trained personnel to use this equipment). The EdTech Center provides a centralized location for these resources, both in equipment and personnel. Funded projects are expected to help purchase equipment needed for a particular project. This equipment is then available for others to use on their projects. This is especially needed with the current budget problems. Most of the EdTech Center's new equipment and software is and will be coming through funded projects.

This is also true for software. Campus units cannot afford specialized software for every application. The EdTech Center offers a centralized resource in the form of this specialized software needed for interactive multimedia projects. AuthorWare, Director, Astound, and several image scanning, enhancing, and converting packages are already available. Funded projects purchase specific software for the Center. This software is then available for use on subsequent projects.

Finding skilled labor for multimedia projects is difficult. There are lots of "gamers" around, but how many of these can actually design a screen layout? Individual departments cannot afford to have trained, expert help. The EdTech Center has experts in scanning, image enhancement and conversion, graphic design, even animation. Funded projects, which often bring in new equipment and software, also bring in funding for student workers. These students are carefully selected, often for specific skills, and are trained to be specialists in certain areas, for example, video and audio taping and editing, special effects, and animation. They are often trained to be experts on

particular software as well as on particular pieces of equipment. This is much less expensive than hiring full-time staff, and it is excellent experience for the students, providing them with not only a paycheck, but also highly marketable multimedia skills.

This model also provides a method of reviewing works in progress. The committees are kept up-to-date on the progress of individual projects. Records of expenses and times needed to complete certain portions of a project as well as records of special problems that arise are all kept for reference for other projects.

The model provides communication. The ideas and concepts as well as the progress of the actual project are filtered throughout the campus and beyond. This is possible because the committees are generally campus-wide in nature, being composed of faculty and administrators from all parts of the campus. Their work has both broad input and broad output as well due to network newsgroups, campus publications, and web pages. All of this promotes sharing of resources and ideas between departments instead of the attitude of this-is-mine-and-you-can't-use-it that has been seen in the past.

SUMMARY AND CONCLUSIONS

In summary, this model, which is both a procedure and product, is good for the University since it efficiently uses equipment, software, and personnel resources; good for the faculty since they can freely express their ideas, share with colleagues, and see their ideas to fruition; good for students in the classroom since they get new and exciting materials presented to them; and good for students in the workplace since they develop (and get paid for developing) highly marketable skills.

Prototype Expert System for Climate Classification

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Abstract

Many students find climate classification laborious and time-consuming, and so fail to grasp the details of classification due to lack of repetition. The author is developing software for climate classification in the C programming language. Using an expert system, students can more easily classify large numbers of data sets and so learn both the logic and method of Koppen's climate classification system through repetition. Custom-designed software can also help students learn other classifications and similar activities. Reluctant students may overcome computer "phobias" while using this simple program and be coaxed into using computers for other activities as well.

Introduction

An expert system is a rule-based software program that can be used for decision making. Scientific classifications are typically rule based and so are appropriate for use in expert systems. Several expert systems for mineral classification are available for use on personal computers (e.g., Diemer, et al., 1989; Donahoe, et al., 1989; Hart and Newmarch, 1988). This paper describes the characteristics of an expert system for climate classification that is currently being developed.

Nature of classification: The expert system described herein is based on an empiric classification. Empiric classification uses physical traits of the subject rather than information about its origins; it is a "what" classification rather than a "why." Empiric classifications are particularly appropriate for use in an expert system because they usually are based on presence or absence of characteristics, or abundance of components. This makes them easy to convert to a computer program.

Climate, Koppen's classification system, and climographs: Climates and climate classification are an integral part of meteorology, the study of weather. One of the earliest climate classifications, developed by the ancient Greeks, was based on temperature. This system divided the Earth into just three climate zones: torrid, temperate, and frigid. Modern empiric climate classifications take into account both temperature and precipitation patterns and so recognize many more climate categories. Numerous climate classification systems have been developed; however, the most widely used system was developed by Vladimir Koppen during the first half of this century.

In the Koppen system (Fig. 1a-b), geographic localities are assigned climate sub-categories (for example, humid subtropical, Cfa; Fig. 2) based on their monthly and annual precipitation and temperature averages. The boundaries between the individual climate categories loosely correspond to global vegetation distribution. For example, the division between polar (E) and microthermal (D) climates is a mean monthly temperature of 10°C or 50°F (Fig. 1a), the temperature below which trees do not flourish. Koppen's classification is a useful tool for learning about the nature of climates and climate distribution, as well as climate classification. Both the process and the product of classification are important. That is why methodical, repetitious use of the classification is crucial. Climographs (Fig. 3), standard-format graphs of precipitation and temperature data, also help students visualize the general trends and relationships in the climatic data they classify.

Computer-based classification

Advantages of computer classification: A computer program designed specifically for climate classification should prove very helpful for learning the Koppen classification system. As students use the program, the methodology of classification will be presented and subsequently reinforced. Having the computer ask the user a series of questions relieves the tedium of

Begin here:

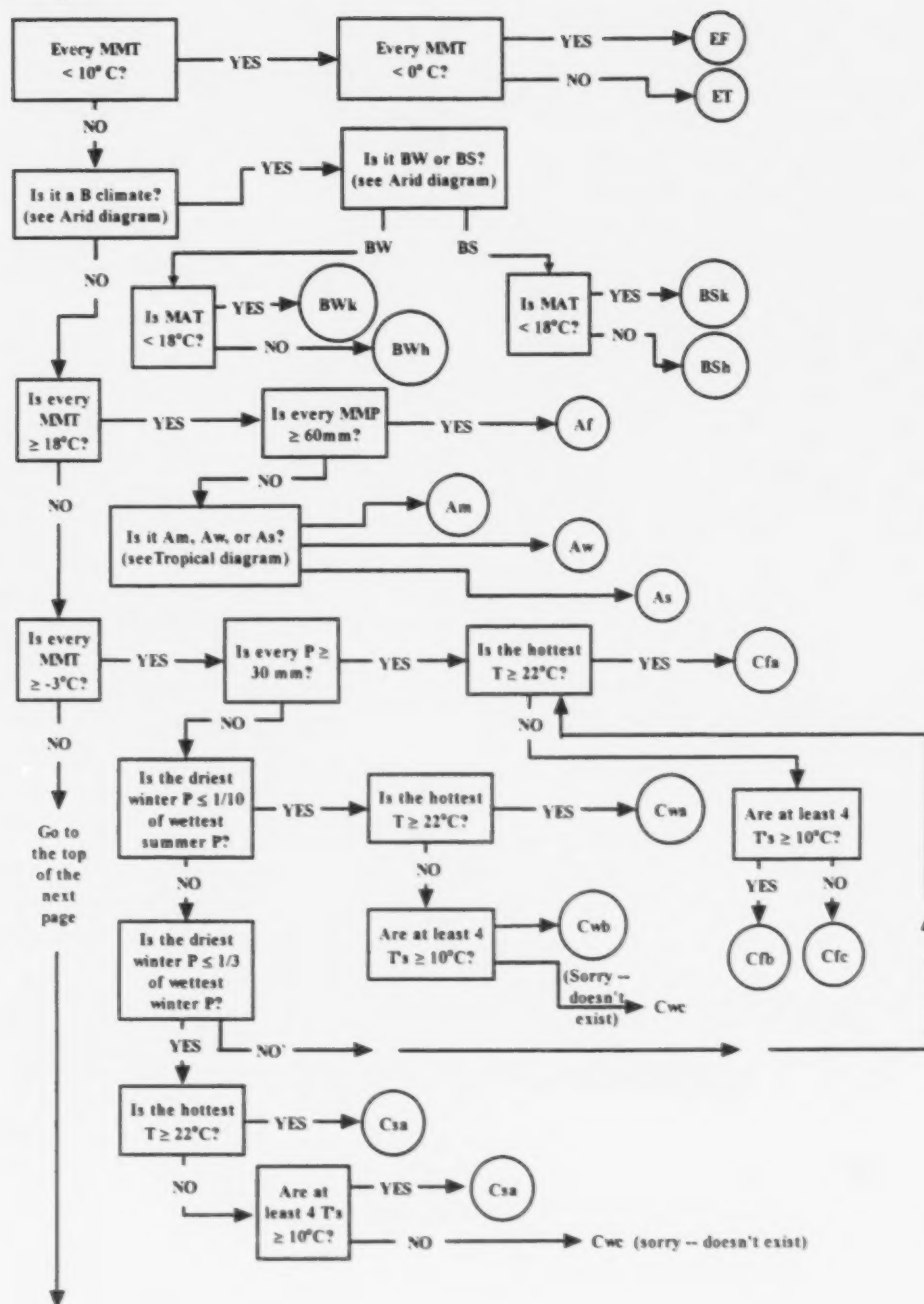


Figure 1a. Flowchart for Koppen climate classification system, climates A, B, C and E. T = temperature, P = precipitation, MMT = mean monthly temp., MAT = mean annual temp., MAP = mean annual precipitation, MMP = mean monthly precipitation. See Figure 2 for other codes. (Modified from Suckling and Doyon, 1991, p. 148)

Continue here:

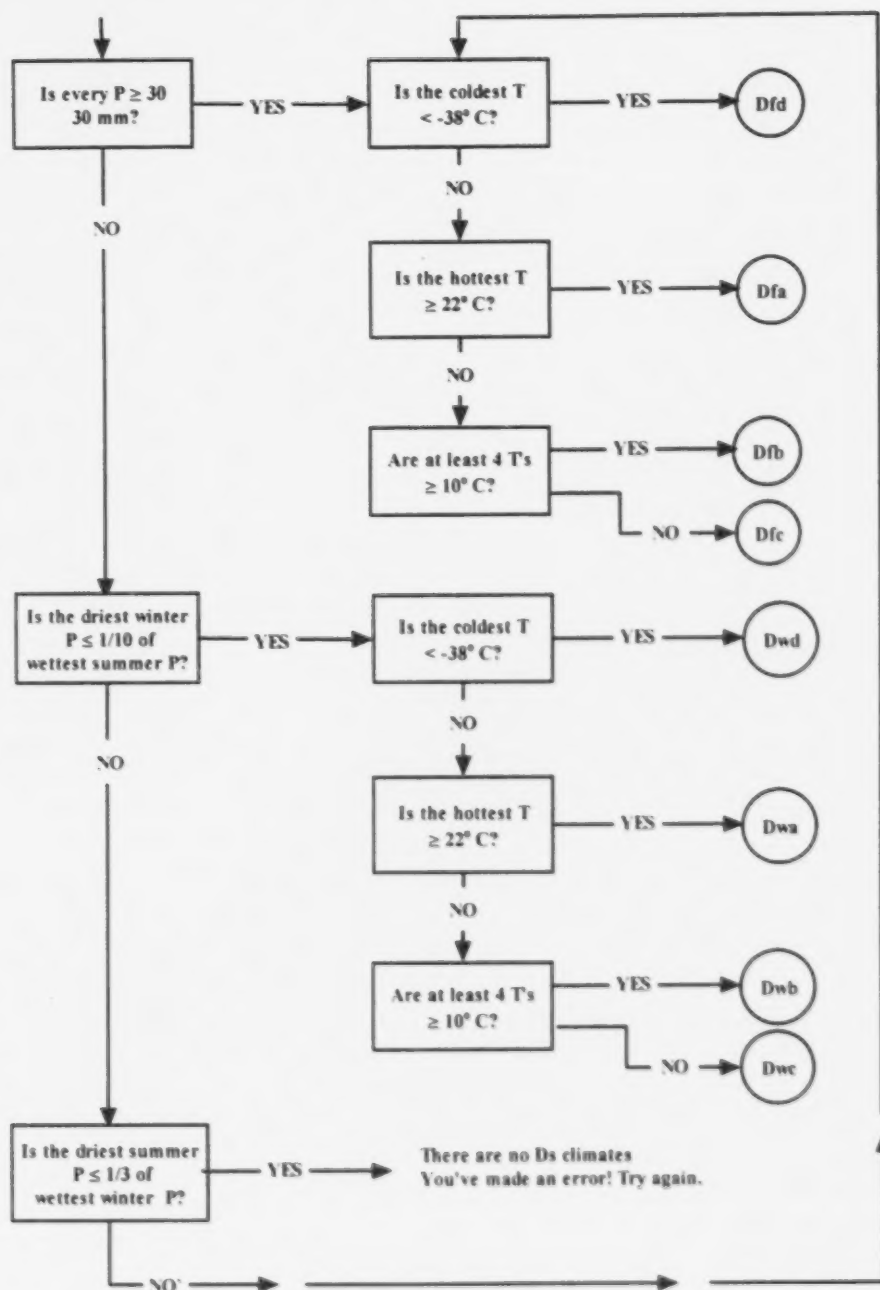


Figure 1b. Flowchart for Koppen climate classification system, D climates. (Modified from Suckling and Doyon, 1991, p. 149)

Climate categories	Codes and sub-categories	Climate categories	Codes and sub-categories
Tropical (A)	Af - Tropical rain forest	Mesothermal (C)	Csa, Csb - Mediterranean
	Am - Tropical monsoon		Cwa, Cwb - Subtropical monsoon
	Aw - Tropical savanna		Cfa - Humid, subtropical
Arid/Semi-arid (B)	BW - Desert		Cfb, Cfc - Marine West Coast
	BS - Steppe	Microthermal (D)	Dfa, Dfb, Dwa, Dwb - Humid continental
Polar (E)	EF - Ice cap		Dfc, Dfd, Dwc, Dwd - Subarctic
	ET - Tundra		

Figure 2. Summary of climate subcategories and climate codes within the Koppen classification system.

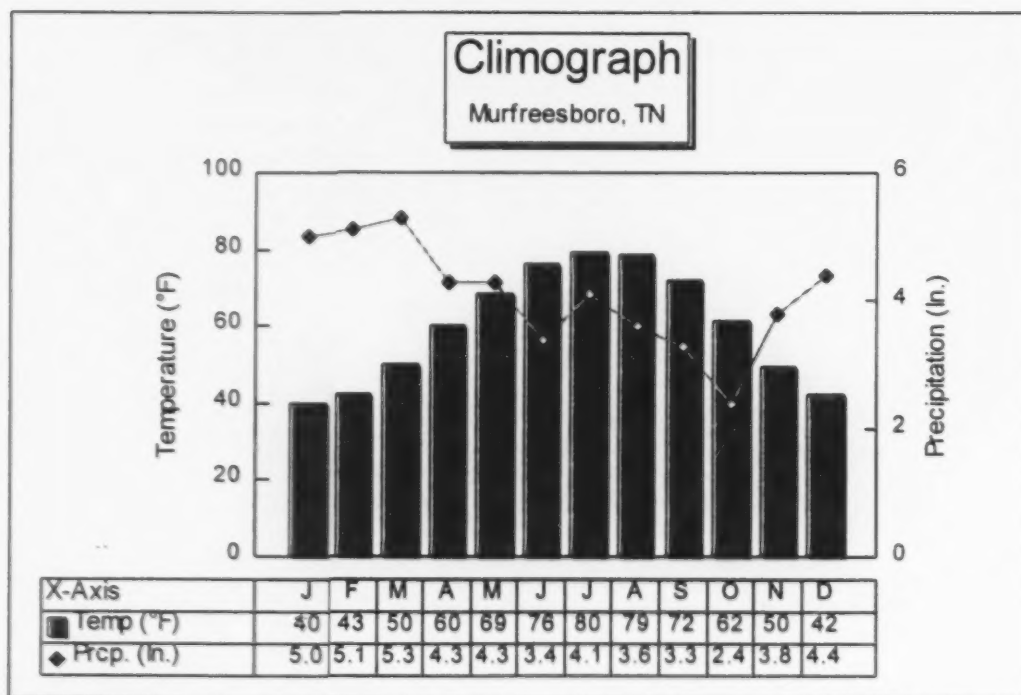


Figure 3. Sample climograph based on temperature and precipitation data from Murfreesboro, Tennessee.

classification -- for some it may even be enjoyable -- while allowing the user to better understand the significance of each of the steps required for climate classification. Although the individual steps are rather simple, classification with the Koppen system can appear involved (Figure 1a-b) and the logic of the system often escapes students when they are asked to manually classify sets of climate data. Repetitively classifying climates helps students to better understand the controls on climate and climate distribution as well as the strengths and weaknesses of the Koppen classification system.

With the software providing data handling support, students can focus on the systematics of classification, rather than on logistics such as numerical calculations and formulas. Relieved of this burden, students are more likely to remain attentive and to perform multiple repetitions. Using a computer for classification also allows students to recognize that computers are useful for repetitive tasks, and are an especially powerful tool when used as an expert system. Providing screen and printed output in the form of climographs should help students to visualize climate data and climatic relationships.

For some students this may be their first exposure to computers. Computer-illiterate students will use the computer in a very controlled environment, helping to minimize the potential for intimidation. This program may allow reluctant students to overcome their computer-related anxieties and coax them into the use of computers for other types of projects. The computer illiterate student is one of my main motivations for developing this software. College students who choose to remain computer-illiterate are, I believe, doing themselves a grave disservice. I consider my classes an opportunity to expose computer-illiterate students to computers in a low stress setting with minimal demands. Use of a software program in a general studies science course may be a computer-illiterate student's last opportunity for exposure to computers before entering the job market.

Pitfalls of computer classification: The major shortcoming of computer-assisted classification is really no different than that for manual classification: an unmotivated student can easily work through the program, ignoring the information presented, and quickly finish the assignment. However, due to the ease of use of the software as compared to manual classification, the student is perhaps more likely to perform the assignment and learn about the methodology involved.

Another possible problem is that of "computer-phobic" students refusing to use the software. The instructor can avoid this problem in two ways. First, either develop or obtain software that is very easy to use. As discussed below, that is one of the main reasons I choose to develop my own software using the C programming language. By doing so, I gain control over the nature and operation of the user interface. Second, provide students with ample instruction in the use of the program and opportunities to explore it in your presence. These two steps should alleviate most, if not all, of the difficulty in getting "computer-phobic" students to participate in computer-assisted assignments.

Rationale for the C programming language and a DOS-based program: The expert system discussed here is being developed using the C programming language. In addition, I am using a C function library of user-interface tools that aid in development of a "windowed" user interface with pull-down menus, pop-up help screens, data entry windows, etc.

Using the C programming language to develop this software rather than a programmable database or spreadsheet program, can be justified in several ways. These include:

- substantially less computer knowledge required on the part of students
- minimal system requirements -- runs on virtually any PC-compatible computer
- requires no other software packages for operation -- no risk of violating software licenses, or problems with students being dependent on software availability in campus computer labs
- easily converted to other computer platforms (e.g. UNIX) due to the popularity of the C programming language

The software will be appropriate for use on virtually any PC-compatible computer with a 5-1/4" or 3-1/2" disk drive, 640K of memory and graphics capability. Although it might be easier to program for the Microsoft® Windows™ operating system/graphical user interface, I am intentionally avoiding Windows because of its less widespread presence in the computing world and its more complex operating environment. While arguments can be made concerning the ease of use of Windows, DOS-based programs are easier to set up so that the user has no interaction with the operating system. In the case of MS-Windows, it is difficult, if not impossible, to eliminate the need for knowledge concerning how to open and close windows, start up programs, choose drives, etc.

Program design, development and capabilities

Program design: This software is designed to perform the following tasks:

- accept climatic data input by the user;
- classify climates based on data input;
- interactively indicate procedures used for classification;
- output tabular data summaries and climographs to the screen;
- save data sets to disk for later use;
- print out data, graphs, and climatic summaries for each data set.

The user interface is "window" based. Error-checking routines test for invalid data and key strokes and advise the user accordingly. Help screens are available throughout.

Software development: Anyone who has undertaken a large computer programming project recognizes that it is time-consuming. Thorough planning is the key to success. Time spent in the planning stages will pay off later with time savings by avoiding pitfalls and false starts. The program should be developed as a series of independent modules. A modular approach makes software development and debugging more manageable. A modular approach also makes later additions of program enhancements easier, and less "buggy."

The modules should closely correspond to the program's main facilities and functions. The modules are as follows:

- | | | |
|-------------------------------------|----------------------------|---------------------|
| • user interface | • tabular output | • disk input/output |
| • climate classification algorithms | • graphic output | • printer output |
| • data input | • interactive input/output | |

The initial stages of program development involve either writing "pseudocode" -- a simplified, English-language version of the actual C code -- or constructing flow charts of the program logic. This allows rapid development of the basic organization and logic of the overall program. Figures 1a and 1b represent at least part of logic necessary for development of the climate classification algorithms.

After developing the program's logic and structure, the programmer writes and debugs the actual C language routines for the individual modules. Next, the modules must be integrated, and debugged again. Finally, the program is extensively tested for any memory conflicts, hidden bugs, or other problems. Depending on the skill level of the programmer, development time per module may be ten to twenty hours or more. If the developer uses one of the more recently developed MicroSoft Windows™-based development packages (e.g. Microsoft's Visual Basic™), development times should be somewhat shorter, but there is a corresponding loss of control over the user interface and operating environment.

Future enhancements: After the program is fully functional and has been used enough by students to work out any hidden bugs, I hope to add a mouse-driven interface. The use of a mouse in the data entry portion of the program is superfluous as the key strokes are simple and consist mostly of typing data with a few simple menu choices. However, a mouse-driven interface will enable me to add another, very significant enhancement to the program: a world map illustrating climate distribution. After clicking on a particular climatic region, the user will be shown a descriptive summary of the region's climate and a synopsis of the mechanisms responsible for its existence.

Pedagogic approach

Classroom and independent instruction: I envision this expert system being used by both the instructor and students. Using the software in a computer laboratory on campus, the instructor could present the concepts of climate classification and climographs, and explain the Koppen classification system in detail. Students would then be shown how to use the Koppen system to classify a variety of world climates. While in class, the instructor could assign each student two or three data sets for in-class, manual classification. After students complete this task, the instructor might review the mechanics of climate classification by manually classifying the assigned data sets.

After students begin to grasp the nature of classification with the Koppen system, they could receive a copy of the software as well as instruction in its use. The instructor would then assign about twenty data sets for classification, either in class or at home, using the expert system.

Before performing each step in the classification, the user can receive instructions concerning either software operation or the logistic of the current classification step using the integrated help screens. After completing a step, students can either proceed to the next step, or review the completed step. With this approach, the novice user can receive interactive help at anytime; however, once proficient, s/he can quickly navigate through the classification procedure.

Project evaluation: After students classify a number of data sets manually and using the expert system, they should be given a written survey to complete. The survey might ask students to

discuss how well the software aided their understanding of the classification system, and to rate the ease of use and speed of software-aided classification as compared to manual classification. Students might also be asked to write a short narrative expressing their overall opinion of the software, for example, whether they enjoyed using it, what they would do differently, whether it was fun, easy, visually interesting, etc. Feedback from the students could be used to make improvements to the program, if necessary, as well as to isolate and correct any software "bugs."

Conclusions

Using this software, all students should experience an increase in their understanding of climates and climate classification. Software-driven classification provides multi-media instruction when combined with lecture, visual aids, assigned readings, and manual classification. A multi-media approach should better serve the range of student needs in terms of learning strategies, and reduce the likelihood of students becoming bored or failing to grasp the methodology of climate classification.

Software development with the C programming language provides programmers with both flexibility and control in developing the user interface, and with great potential for portability to other computer platforms.

Based on the author's experiences using other types of software in the classroom, instructors should anticipate a range of responses from students using this expert system. Nearly all computer-literate students should find it easy to use and helpful in learning the Koppen climate classification system. Initially, students who are not familiar with computers may be somewhat intimidated by the software. Instructors should offer "computer-phobic" students ample opportunity to become comfortable with the computer and the software program before students begin the computer-aided part of the assignment on their own.

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**Simulating Professional/Client Interaction:
The Benefits of Computer Multimedia and Video**

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Abstract

A multimedia-style computer application is detailed that facilitates students' role-playing in a simulated business situation. The incorporation of video footage lends a 'face' to a theoretical client the student is challenged to interact with to bring about the successful conclusion of a potentially calamitous situation. The process of video creation is discussed along with the benefits to those involved. Applications of the multimedia/video concept to other fields of study are considered.

BACKGROUND

Use of computers in an interactive multimedia capacity is noted as a successful means of communicating written and graphic information and allowing user interaction, which is a combination some researchers see as the most effective means of promoting information retention (Monti, Cicchetti, Goodkind & Guanaco, 1994, pp. 66).

Many courses of study within higher education are beginning to explore the merits of computer multimedia. In the field of interior design, for example, multimedia is being used to teach such concepts as the elements and principles of design (Scott, 1993) and computer animation to further client understanding of interior projects (Hosken & Thompson, 1993). Computerized multimedia techniques (implying a computer program with audio input, interactivity with the user and video footage) may prove to be an equally successful learning tool in the area of professional/client interaction, and not only within the field of interior design.

RATIONALE

Students involved in internships are often out of necessity relegated to the completion of rather mundane tasks and hence can be isolated from typical

misunderstandings or difficulties that may arise between the professional and his or her clients or patients. The intern thus may miss a valuable learning opportunity of how to correctly handle common business and ethical situations and may be unprepared for such occurrences after graduation.

Project's Beginning: Role Playing Exercises

Role-playing exercises created in the recent past by the author have benefited interior design students in exposing them to such dilemmas. In these exercises, students are placed into the role of either the client or the interior designer and are presented with a situation that results in an ethical or moral dilemma to the interior designer. The student team is then asked to reach a compromise agreeable to both parties. While these exercises prove to be successful, the natural tendency of the student playing the role of the client is to be timid in their performance of the client's moods and reactions. A more forceful presentation might prove more effective.

PURPOSE

Exposing students to as real a calamitous professional situation as possible in a 'safe' computer environment may better prepare them to deal with real dilemmas when they arise in their fields. Multimedia computerization may provide an even more realistic scenario than a student role-playing format, as the student is now faced with a sometimes intimidating client through video footage which has a face, name and manner that is definitely not a fellow student's. Interactive

multimedia computerization has the potential to bring the student into a 'first person' situation in a developing business dilemma.

PROCEDURE

A multimedia computer program has been developed which presents the student with a reality-based business situation they might encounter in actual interior design practice. The Gold Disk Astound program and Video Spigot video footage incorporation tool are utilized to create the program which is operable on any Windows-based 486 PC or Apple computer with external speakers, a 3" floppy disk drive and an upgraded video card that will accept video footage. It is not necessary for the computer to have the Astound program resident in its memory.

Use of the Program

Class discussion concerning interior design business practices and ethical considerations prefaces the student's exposure to this computer program. Then, working alone at the computer, the student faces the increasingly problematic situation and must interact with the described (and sometimes angry!) client. Thus the student is pressed to make judgments concerning ethics and standard procedures of business as the situation progresses. Throughout the dilemma the student must choose from several choices of action by selecting a described response with the computer mouse. In such a manner the student slowly wends their way through the situation, ultimately reaching one of several possible sets

of conclusions. The implications of their choice are then summarized and the student is directed to explore the outcomes of the other choices they might have made. Thus, the suggested successful outcome to the difficulty is investigated as well as the other less appropriate course of action.

At the program's conclusion, a list of questions is posed that the student answers in written format based on their experiences with the dilemma. These questions form the foundation for post-test discussion in the group classroom setting.

PROJECT DEVELOPMENT

A unique aspect of this multimedia program is found in the collaboration necessary for its creation. The video segments that are central to the multimedia program demand as professional a quality as the multimedia application itself. Thus, early on in project development, a cross-campus relationship evolved between faculty of Interior Design and Mass Communications.

Script Creation

After the author determined that project structure would be appropriate for multimedia/video applications, the Department of Mass Communications was approached to provide guidance and services for the video segments to be used within the finished piece. Through several consultative meetings, continual

reference to the project's master plan and multiple rough script drafts, a film style single camera script was developed.ⁱ

After the video segments were incorporated into the project's multimedia script, the scripting process was completed to facilitate the video shoot (see attached script sample). Before actual production began and to ensure that no essential material was overlooked in the shooting process, shot sheets were created. These production tools laid out the entire project scene by scene and accompanied the producers on the day of shooting. Thus, as each necessary shot was completed, it was checked off on the list for that particular scene (see attached shot sheet for scene 1).

Bringing It All Together

While the script and shot sheets were being developed other activities were accomplished to ensure success on shooting day. Economical talent was located who could play the role of Mr. Jim Mason, the central character within the computer/video application. After determination that union actors' fees lay beyond the scope of the project's budget, a fellow faculty member volunteered his time and skills to the project. He was briefed on the script and became familiar with his role before taping. A second talent was recruited to play Andrew, a character with a minor, yet crucial role. A television production student volunteered to act the part and accompanied the team on shooting day as both talent and crew member.

Another preproduction necessity was finding a location for the shoot which was available on shooting day and looked like the office of a successful businessman. Fortunately, the producers had the support of the University's administration and the Provost, out of town for the day, offered the use of his office. Additionally, an old tattered conference room was located which would provide footage necessary for inclusion in the finished product. Having secured a location, producers set up a crew composed of advanced Mass Communications television production students. The crew checked out and familiarized themselves with the necessary equipment which included camera, lavalier microphones and lighting instruments to provide scene illumination.

As the day of shooting approached, props needed for the shoot were created or found. A 'dummy' contract was fabricated by the producer, mock 'floor plans' were retrieved, a watch was worn by the actor, and a calendar found its way to the Provost's desk-- all necessary objects that played a part in the script.

With all props gathered, script and shot sheets completed, location confirmed, equipment tested and crew assigned, the day of shooting went smoothly. No shots were overlooked, talent performed well, audio and lighting were satisfactory and all material needed for completion of the final project was gathered successfully.

After shooting day the video material was edited together to complete the different video segments for use within the finished multimedia project. The editing process went well and quality video segments were available for inclusion. The edited material was incorporated and edited into the finished computer application.

PROJECT BENEFITS

The videotaping process offered multiple benefits to different persons involved in the project, students as well as producers. First, this project provided a wonderful opportunity for Mass Communications video production students to become involved in an important, applied production. Within this project students acted as both talent and crew, providing technical support during the videotaping sessions and subsequent post production editing sessions. Experiential learning of this type is exceptionally beneficial to students. In addition, experience of this kind makes students more attractive to potential employers and those granting professional internship opportunities.

Secondly, the project parameters and video segments were fairly simple in production format and style, providing an opportunity for the creation of a project utilizing available equipment at very small costs. These factors made it possible for 'novices' to achieve the satisfaction of having made their first multimedia project incorporating video segments without having a significant amount of money invested in a 'trial'. Mass Communication department equipment was

utilized for no charge and taping was accomplished on S-VHS tapes utilizing standard analog recording processes, resulting in video quality at a near professional level.

Students within the interior design program at Southeast Missouri State University also benefited from this project as it provided interactive, hands-on decision-making opportunities in an applied and experiential manner. While the completed project had some glitches in regard to video quality (to be discussed shortly), this quality concern does not inhibit or impair the learning experience students have had with the project.

The university and faculty also gained from this project by way of the interdepartmental nature of the project. Cross-campus camaraderie resulted and, prompted by the discovery of how well the faculty worked together, their pooled efforts eventually led to the penmanship of a grant to create an educational historic preservation video production.

Without the expertise of Interior Design and Mass Communication faculty this project would have been extremely difficult, if not impossible, to produce. In addition, other faculty are commended for their support through the supplying of talent for the project. Essentially, the expertise, patience, and support of many people in multiple departments and the University's administration made the project's goal attainable.

VIDEO QUALITY ISSUES

As evidenced in the video demonstration of the multimedia project, there are some fairly serious problems with the quality of the video in the finished program. Specifically, the audio component of the video plays back in "real time" (meaning that it plays back at the same speed as originally recorded) and the video plays back in a manner which appeared choppy and slow, in effect lagging behind the audio. Originally the authors thought the problem might have been caused by the fact the video was recorded in an analog format and ultimately played back in digital form via the computer's hard drive. As we have learned since production, while it is ideal to shoot the video in digital format, an analog video signal is generally not problematic with such projects. The greatest concern an original analog format has is the fact that images, when reproduced in digital form, will appear to be somewhat grainy.

When supporting the inclusion of video segments, computer hardware support capable of quick data retrieval is paramount. This multimedia computer application was produced using a 66 Mhz Pentium computer with 16 megabytes of RAM and 540 gigabytes of hard drive space. While the hardware utilized was adequate for this particular application in that the educational value of the project was not impaired, the optimal hardware selection for such a project would be a 100-133 Mhz Pentium processor with 32-64 megabytes of RAM and at least one gigabyte of hard drive space. Such speed and disk space would ensure that

video segments run smoothly and in real time. It is foreseen that the application will be transferred to such a computer for resolution of these problems. The use of more sophisticated multimedia programs, such as Authorware and MacroMedia Director is also currently being investigated.

MULTIMEDIA AND VIDEO: APPLICATIONS TO OTHER FIELDS

This particular application focused on promoting ethical and appropriate decision making in the specific academic area of interior design. The application of such interactive computer programs to other areas of academia leads to a nearly inexhaustible list. Application incorporating video could be utilized within any area which involves the education of students who must learn to think their way through any ethical, legal, creative, social, health care or business issue. This form of interactive program could easily be used in academic settings as varied as the following:

- social work
- nursing
- architecture and interior design
- exercise physiology
- newswriting
- public relations
- marketing and management
- advertising
- journalism
- video production
- radio formatting

While applications of this project type are as varied as the different programs a school may offer, the key, and most crucial, factor in the development of successful productions is the presence of faculty who are willing to learn new

technologies and to experiment as the producers of this project did. University support of hardware purchases necessary for such productions is also an obvious prerequisite, as well as the institution's willingness to invest in the training of their faculty to learn such new teaching methods.

Academicians who are interested in learning more about multimedia and video applications are encouraged to reference our addendum which provides website addresses and a short bibliography.

Select Bibliography

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Endnotes

¹ Script writing references are available; several different styles are commonly utilized. See bibliography for one such source of information.

VIDEO SEGMENT SCRIPT:
Scene I

Text screen:

Welcome to Client-Interior Designer Computerized Interactive Challenges!!

Text screen:

In a few seconds you will be placed into a situation where you shall play the role of a professional interior designer. It is your responsibility to respond in an ethical way to this situation using sound business procedures. Your livelihood as an interior designer, in fact, depends upon it!

Text screen:

As the situation develops, you shall be asked to make a series of choices that shall guide your destiny in the situation. Choose your response from the available list of choices. If your exact choice is not listed, pick the one closest to your decision. Consider each carefully before you make it!

Text screen:

At the end of the situation you shall learn the consequences of your decisions.

Good luck and choose wisely!

Text screen:

Meet the players in this scenario...

Text screen: with clipart image/designed text of 'you'.

You are a young interior designer establishing your own design practice and are involved in both residential and commercial space planning, design and sales. At this point in time you are eager to create a client base that will not only be pleased with your work but will return to you for future projects. Along with this you recognize the need to establish a good reputation for yourself in not only your design skills but also in your business practices.

Text screen: with scanned image of actor playing client

Your client is an influential area businessman named Jim Mason. He is in his mid-forties and is single. His position as a powerful stockbroker could cause him to be a valuable contact for you and his positive reference very well might lead to other lucrative work in the future. Mr. Mason has earned a reputation as a shrewd man and possesses an expensive taste. The successes he has achieved in past business dealings may in part be due to his keen intuitive and calculating skills.

Text screen: stylized text

The background of your current situation...

Text screen: scanned image of designer and client talking and a house

Mr. Mason has employed your services in the past. Nine months ago he called upon you to renovate a rather large vacation residence in his possession. Mason's expensive tastes dictated that the project was a costly and extravagant undertaking.

Text screen: VHS single image of letter of agreement on a desk

Before the project commenced, Mason grudgingly signed your letter of agreement. Per the terms of the agreement, Mason did eventually pay all fees and costs of the project, but not without numerous courteous phone calls and reminders on your part.

Text screen: with VHS single image of expensive home; clipart of clock.

The project was allowed to progress at a normal pace, as Mason would not be using the residence for 8 months. Upon completion of the project, Mason was pleased.

Text screen: with VHS single image of Mason standing in imposing stance

Through your workings with Mason, however, you determined that he had rightfully earned his reputation as a demanding, cautious and even possibly suspicious man.

Text screen: with clip art of cash/dollar sign

Even with the stress Mason placed upon you, you were pleased you took the project. Not only did you have a pleased client who might provide you with future possible work, but you also benefited financially from such a luxurious project.

Text screen:

Your Challenge....

Text screen:

Mr. Mason has called your firm and wishes to discuss a new project...

VCR segment Scene 1:

MASON IN BUSINESS SUIT SITTING IN HIS OFFICE ON THE PHONE. PACKED SUITCASE WITH OVERCOAT DRAPED OVER IT SITTING ON A CHAIR IS VISIBLE IN THE BACKGROUND.

MASON DIALS AND WAITS FOR ANSWER.

Hello, this is Jim Mason. (PAUSES, LISTENING) Yes, it's nice to talk to you again too. I wanted to let you know that I spent last weekend at the retreat and was most impressed with your work. (PAUSE) Well, you deserve it. I am most interested in helping one with such talent as yours get off the ground. And actually, that's what I'm calling about. You and I worked so well together on the retreat that I've decided I've got another project for you. I think you would enjoy it. (PAUSE) Well, let me tell you a little bit about it and then we can decide when we can get together.

Text screen: VHS still image of a conference room

Mason tells you that he is in desperate and immediate need of having his 20' x 30' conference room remodeled. The space seats fifteen in a comfortable fashion.

VCR segment: MASON STILL AT DESK IN HIS OFFICE ON PHONE.

Now you know my tastes and you know that corporate image we've got to maintain here, so I'm sure you're going to a bangup job. I'm thinking of spending in the neighborhood of fifty thousand or so. (EMPHASIZES) (CLOSEUP) This has got to be done right. (PAUSE) (OFFHANDEDLY) Great, great.

SHOT SHEET:
Opening Text Through Scene I

CUTAWAYS FOR OPEN TEXT SEGMENT

- ___ CU Letter of agreement on desk: still
- ___ WS Conference Room: still
- ___ Conference Room: slow pan
- ___ Conference Room: medium pan
- ___ WS Still of House
- ___ WS Still of bedroom interior scene

SCENE I (pg. 3) : MASON IN BUSINESS SUIT AT DESK

- ___ WS of scene with Mason at desk, include suitcase and overcoat in scene.

ZOOM IN..... **NOTE: non-phone hand out of shot and watch is on that hand!!**

- ___ MWS Mason at desk (Master shot)
- ___ CU Mason at desk (shoot whole scene for edit purposes)
- ___ CU calendar with Mason's hand at date
- ___ CU watch, hand moves into and out of frame

WEBSITES FOR MORE MULTIMEDIA/VIDEO INFORMATION

This is a list of some of the websites that will provide you with resources and information relating to multimedia and video production.

- | | |
|---|--|
| http://www.hyperstand.com/ | This is the address for <u>NewMedia</u> magazine which is dedicated to providing information about the various new media (including both hard and software for producing multimedia and video applications). At the website look for the "Stories Cited in NewMedia" for on-line material. |
| http://www.intel.com/ | This address will give you information relating to Intel Pentium processors (the processors with the power and speed to do super multimedia work). |
| http://www.pinnaclemicro.com/ | You'll learn about optical hard drives and rewritable Optical disks from Pinnacle Micro. These optical disks allow for tremendous amounts of storage (up to two hours of digital video) and boy, are they fast!! |
| http://www.macromedia.com/ | You'll get lots of info on some of the more commonly used multimedia software (ie: Authorware, Director, Soundedit, etc.) at this website. |
| http://www.randomhouse.com/ | This address will give you loads of info about books that Random House Publishes about multimedia applications. One book, <u>Desktop Video Studio</u> , is only \$45.00 and comes with a CD-ROM, to boot! |
| http://www.syllabus.com/ | This address takes you to <u>Syllabus</u> magazine's website, a dynamite place to visit. <u>Syllabus</u> is a magazine specifically dedicated to technology for education. They have lots of articles about multimedia and video applications and even offer great workshops to learn more about it. A two thumbs up!! You can also get a <u>free</u> subscription to <u>Syllabus</u> . Visit the site or call 1-800-773-0670. |

MAKING MATHEMATICS COME ALIVE WITH TECHNOLOGY

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ABSTRACT

Technology can empower students to fulfill ambitious new goals proclaimed in the NCTM *Standards*. What better way to empower students than to provide them with their own private investigator who works tirelessly! In order to prepare prospective teachers of secondary school mathematics to effectively guide the teaching and learning process using technology, the Department of Mathematical Sciences at Middle Tennessee State University has added a new course, Technology in School Mathematics, which is now required as a part of a new Emphasis in Mathematics Education. Furthermore, technology has been integrated into mathematics courses in which prospective teachers are enrolled.

MAKING MATHEMATICS COME ALIVE WITH TECHNOLOGY

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EMPOWERING STUDENTS MATHEMATICALLY

A theme which resonates throughout the National Council of Teachers' of *Mathematics Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989) is that of empowerment. All students should be empowered to actively do meaningful mathematics. Ambitious new goals are proclaimed for all students. All students should value mathematics, have confidence in their ability to do mathematics, become mathematical problem solvers, reason mathematically, and communicate mathematically. Motivating many recommendations in these national standards is the constructivist learning theory - the idea that students actively construct their own knowledge. Accordingly, the role of the instructor changes from that of a dispenser of knowledge to that of a facilitator of learning. The instructor guides students through experiences in which the students explore, conjecture, verify, generalize, and apply results to other settings and realistic problems - the very activities in which mathematicians engage.

In this context, technology is a valuable tool in the teaching and learning of mathematics, for it has the ability to empower mathematics students as well as mathematics instructors. What better way to empower students than to provide them with their own private investigator, one which will work day and night at the request of the mathematics student who holds power over it, willing to perform tasks repeatedly, however mundane!

ROLES OF TECHNOLOGY IN THE TEACHING AND LEARNING OF MATHEMATICS

Technology can serve at least four roles in the teaching and learning of mathematics. Specifically, technology can aid in (1) mathematical concept and skill development, (2) mathematical problem solving, (3) mathematical reasoning, and (4) mathematical communication (Kimmins, 1995; Kimmins and Bouldin, 1996).

Technology as an Aid in Mathematical Concept and Skill Development

Specifically in the realm of mathematical concept and skill development, technology (1) empowers students to deal with multiple representations, (2) enhances ability to visualize, (3) increases opportunity to construct mathematical knowledge, and (4) enhances opportunity for individualized and customized diagnosis, remediation and evaluation (Kimmins, 1995).

With graphing calculators and computer algebra systems, students can explore symbolic, numeric, and graphical representations of functions instead concentrating on the symbolic. Exposing students to multiple representations is important because, in addition to the pedagogical advantages of viewing a topic from multiple perspectives, functional models arising from situations encountered in other disciplines often arise in graphical or numeric form instead of symbolic form (NCTM, 1989).

Three - dimensional graphing packages allow students to view solids from different perspectives, thus helping students to see models they had difficulty visualizing otherwise, and at the same time, improving their spatial visualization capabilities (NCTM, 1989; Zimmerman, 1991). An example is the visualization of solids of revolution commonly encountered in first or second semester calculus. An interesting example is that of revolving the graph of $f(x) = e^{\frac{-1}{x^2}} + .1$ with domain $[-1,2]$ about the x- axis. The resulting solid of revolution is a "goblet" (Evans & Johnson, 1992). Programs such as Gyrographics from Mathware (formerly from Cipher Systems) allow students to literally revolve a graph about a line and mentally picture the resulting solid of revolution. Then the actual solid of revolution can be drawn and the mental picture confirmed. Finally, the solid can be viewed from any perspective simply by manipulating arrow keys.

Another interesting example in the realm of visualization is the use of Gyrographics to create a graph of a function with a tangent line "riding the curve." Students can literally see that the tangent line is above the graph at points where the graph is concave down and below the graph at points where the graph is concave up. Students literally see the tangent line passing from above to below, or vice-versa, at the point of inflection (Gyrographics Users Manual, 1990).

Tools such as dynamic geometry software allow students to construct mathematical knowledge rather than memorizing theorems dispensed by the instructor. Students can be guided by the instructor to explore, for example, the properties of medians of a triangle using dynamic geometry software and thus discover that the medians always intersect in a point. In so doing, technology functions as a private investigator gathering data for conjectures (Chazan & Houde, 1989; Education Development Center for Learning Technology, 1991; Klotz, 1991; NCTM, 1989).

One striking set of examples of technology making mathematics come alive in conjunction with concept and skill development is the set of possibilities afforded by the Computer Based Laboratory for Texas Instruments Calculators. Using probes and sensors, physical data can be gathered and stored in the calculator. For example, the motion detector allows a position function, and thus a velocity function, to be graphed for motion detected by the motion sensor. Students can be provided with a calculator-generated position or velocity graph and asked to walk in a straight line so as to produce that graph. Instead of an instructor interpreting for students various position and velocity graphs in terms of actual motion, students physically move in such a way as to replicate the graphs (Texas Instruments, 1994).

Finally, a unique example of the power of technology for concept and skill development can be seen in the use of computer and/or calculator programs to simulate sequences of random events. Randomness is the basis for the study of probability and statistics. Research has shown that many individuals have misconceptions concerning randomness. For example, when asked to write a "typical" sequence of H's and T's resulting from the toss of a coin ten times, most people will write a sequence with no runs of length three, while in fact the probability of getting a run of length three or more is .8 (Moore, 1990). Probability Constructor software by Logal, which simulates various random events and displays the results in various ways is an excellent example of this type of software.

Technology as an Aid in Mathematical Problem Solving

In the realm of mathematical problem solving, technology provides students (1) enhanced ability to focus on the process of problem solving instead of the computational aspect, (2) enhanced ability to solve realistic problems instead of being restricted to contrived problems having "nice solutions," (3) enhanced opportunity to be introduced to interesting problems and associated mathematical subject matter much earlier than before possible, and (4) increased opportunity to develop mathematical modeling skills (Kimmins, 1995).

An example of the empowering role of technology as an aid in mathematical problem solving is middle school students solving optimization problems traditionally reserved for calculus students. For example, a typical problem in first-semester calculus texts is the following:

A box is to be made from a piece of cardboard 10 feet by 2 feet. In order to make the box, a square measuring x feet by x feet is cut from each corner of the cardboard. Find x in order to maximize the volume of the box.

Students can write a calculator or computer program or use the table function on their calculator to generate a table of values of x and the associated volume. The largest volume can be literally observed from the table. Alternatively, the function modeling the problem can be graphed on a calculator or computer and the maximum point observed. Working with a numeric or graphical representation gives middle school students the power to solve this problem, rather than waiting until calculus provides them the necessary machinery to use the traditional symbolic approach. The technology empowers the student to concentrate on the process of problem solving rather than on computations (NCTM, 1989).

Technology can afford students increased opportunity to develop mathematical modeling skills. For example, students can be challenged to write a computer or calculator program to simulate the selection of a five-card hand from a 52 card deck. The results of many such simulations would allow students to estimate the probability of various types of card hands before they learned the counting principles necessary to compute the theoretical probabilities. In this exercise students must determine how to model a deck of 52 cards with the first 12 counting numbers. In addition to modeling skills, mathematical reasoning and communication skills are

developed, as students must use precise language in order to communicate the appropriate tasks to the computer or calculator.

Technology as an Aid in Mathematical Reasoning

In the context of mathematical reasoning, technology has the potential to (1) empower students to gather data in order to form conjectures and apply inductive reasoning and (2) motivate students to think logically in the context of programming a calculator or computer to perform a desired task. As illustrated previously through the examples of students gathering data concerning medians of a triangle and of students writing calculator or computer code to model a card hand, technology empowers students in the realm of mathematical reasoning (Kimmins, 1995).

Technology as an Aid in Mathematical Communication

In the realm of mathematical communication, technology can enhance (1) motivation to communicate mathematics precisely and (2) ability to present mathematical ideas both orally and in writing. Precise language is essential when programming a calculator or a computer to perform a desired task. Mathematical thought has to be well-formulated and translated into the language of the calculator or computer when, for example, a computer or calculator is programmed to estimate the probability that a quadratic equation has real roots under varying conditions on the coefficients. Furthermore, mathematical communication is fostered when students use word processors and presentation software to write and present reports which include mathematical symbols, tables, and graphs (Kimmins, 1995).

TECHNOLOGY AND TEACHER PREPARATION

How can universities lead prospective teachers of middle and secondary school mathematics to realize the empowering role of technology in the teaching and learning of mathematics and prepare them to guide the learning process using technology? The Department of Mathematical Sciences at Middle Tennessee State University has initiated a three-pronged approach: (1) development of a new Emphasis in Mathematics Education at the undergraduate level required of mathematics majors preparing to teach secondary school mathematics, (2) development of a new course, Technology in School Mathematics required of all students in the

Mathematics Education Emphasis, and (3) integration of technology into mathematical content courses in which prospective secondary school mathematics teachers are enrolled.

Emphasis in Mathematics Education. As part of revision of the entire undergraduate major, the Mathematical Sciences Department at MTSU has developed an Emphasis in Mathematics Education. All mathematics majors seeking certification must complete this professional program in mathematics education. In agreement with recommendations of the NCTM in the *Professional Standards for Teaching Mathematics* (1991), the courses and activities composing this new emphasis focus on the nature of mathematics, what mathematics secondary students should learn and how they should learn it, innovative teaching strategies, alternative assessment, curriculum development, problem solving and the applications of mathematics, use of technology in teaching and learning mathematics, and state and national trends in mathematics education. The mathematics core consists of 21 hours, specifically Calculus I, II, III; Foundations of Higher Mathematics; Linear Algebra; and Probability and Statistics. Fifteen hours of upper level mathematics courses consist of College Geometry, Abstract Algebra I, History and Philosophy of Mathematics, and two approved upper-level mathematics electives. Technology in School Mathematics, Teaching Mathematics in Grades 5-8, Teaching Mathematics in Grades 9-12, and Topics in Secondary School Mathematics compose the 12 hours requirement in the area of mathematical pedagogy (Kimmins and Bouldin, 1996).

Technology in School Mathematics - A New Course. All students in the Mathematics Education emphasis at MTSU must receive credit in Technology in School Mathematics. Prerequisites of this course are admission to teacher education and completion of the mathematics core, as well as credit in Introduction to Computer Science and Technology in Teaching. Introduction to Computer Science is an introductory course offered by the Department of Computer Science in which students learn a structured programming language. Technology in Teaching, offered by the Department of Educational Leadership, is a part of the secondary education minor. Technology in School Mathematics builds on the skills learned in these prerequisite courses and focuses on mathematics-specific technologies and the associated mathematical pedagogy and

instructional strategies in subject areas such as pre-algebra, algebra, geometry, calculus, probability, statistics, and discrete mathematics. Computer algebra systems, dynamic geometry software, and graphing calculators are emphasized (Kimmins, 1995; Kimmins and Bouldin, 1996).

Technology Use in Mathematical Content Courses. Because "doing mathematics" in the workplace now requires the use of technology in many instances and because of the pedagogical advantages associated with the use of technology in the teaching and learning of mathematics, technology is now a component of many of the mathematics content courses in the mathematics major. Thus, prospective teachers of secondary school mathematics experience appropriate uses of technology and see appropriate instructional strategies using technology modeled in their mathematical content courses. This is vital as we know that "teachers teach as they have been taught."

Mathematics courses which are required of prospective teachers of secondary school mathematics at MTSU and into which technology has been integrated are calculus, abstract algebra, and data analysis. Soon this will be the case for linear algebra and college geometry. Furthermore, prospective teachers at MTSU do mathematics using technology when they elect applied statistics, differential equations, or the deterministic and probabilistic models courses. A new course, Seminar in Mathematics with Technology, can also be elected by prospective teachers of secondary school mathematics (Kimmins & Bouldin, 1996).

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Master Classroom Technology

Running head: MASTER CLASSROOM TECHNOLOGY

Use of Master Classroom Technology to Implement a

Case Study Approach to Learning

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Master Classroom Technology

Abstract

The availability of instructional technology can allow for more innovative teaching strategies in the classroom. This paper describes a case study/client scenario approach used in an advanced medical/surgical nursing course as an example of interactive learning that can be facilitated by the computer technology available in a "master classroom". This approach incorporates concepts of adult learning theory and experiential learning in case studies providing opportunities for critical thinking, creativity, and group interaction. The equipment such as a instructor multimedia computer, student computer stations, networking capabilities and a ceiling mounted multi-source projector facilitate the implementation of the case study/client scenario approach. Four examples are provided that demonstrate variations of the case study/client scenario approach: a "point in time" case study where assessment data and discussion questions are provided; a client case from admission through discharge providing the opportunity for students to discuss the outcomes of care that they have determined to be appropriate; a client case that looks at the chronicity of a health care concern over an extended period of time; and a method of cooperative learning where students groups write their own case study/client scenario.

The use of technology to implement a case study approach to learning has many benefits. These include: (1) an interactive approach - students can take an active part in their own learning and in sharing that information with classmates; (2) a critical thinking approach - students are able to analyze data to determine actions; (3) an extension of available clinical situations - instructors can supplement experiences that may not be available or practical in the clinical setting; (4) practical experience in computer use and group presentation; and (5) facilitation of group interaction.

Master Classroom Technology

Use of Master Classroom Technology to Implement a Case Study Approach to Learning

Introduction:

The availability of instructional technology allows for more innovative teaching strategies in the classroom. This paper describes a case study / client scenario approach used in an advanced medical/surgical nursing course as an example of interactive learning that can be facilitated by the computer technology available in a "master classroom". The "master classroom" in the Middle Tennessee State University (MTSU) Department of Nursing includes a teacher station containing a 486 PC multimedia computer, a VCR, a laser disk player, an audio receiver and speakers interfaced with a ceiling mounted multi-source projector. The room also contains six portable student stations, each with 486 PC computers. The furniture in the room was chosen to allow for movement into small student groups. By using computer technology - i.e. text, graphics, video, word processing, information access, interactive group activities can be integrated into classroom teaching strategies used in class.

Value of Case Study Learning:

Since introduced by Knowles (1980), educators have recognized the value of using adult learning theory in preparing class activities. Knowles' showed that adult learners want to be self-directed and to see the usefulness of the content they are learning. Past experiences are applied to learning activities, and adult learners enjoy active participation which has been shown to help retain what has been learned. Colgrove, et al (1995) describe the "experiential learning" approach where students take an active part in learning. Case studies provide an opportunity to incorporate these ideas, in addition to providing learning opportunities that motivate with active involvement. It provides a means for applying problem solving skills and allowing for decision making in a non-threatening, non-harmful (to the client) environment. Case studies allow students to "experience" actual client situations that may not be available or practical to provide to all students in a clinical setting. Case studies promote the development of critical thinking skills by giving the opportunity for direct exploration of data and seeing the outcome of the nursing and medical plans of care. Fostering critical thinking skills is paramount as "students who are challenged to think critically while still in the classroom setting (can)(sic) translate those skills into the clinical care setting." (Melander, 1996, p. xiii) This approach also shows that there may be multiple "correct" solutions for clinical problems. As case studies are shared in the classroom setting, the instructor provides a method for immediate feedback. Student groups can also develop cooperative learning strategies through guidelines for use in writing their own case studies. This approach fosters creative thinking and promotes group and individual responsibilities for learning and sharing knowledge with their peers.

Implementation of the Case Study Approach:

Several examples are shared below demonstrating implementation of the case study approach. The methods vary with student levels and the complexity of the class objectives.

Example 1

This case is a "point in time" approach where information about a case study / client scenario is presented along with questions that the students are instructed to answer. This is done on a individual basis or in small groups. With the multimedia capability of the teacher station, pictures, graphics or video clips are shown which allow the students to see and hear "data" concerning the client. This approach allows the students to gather and assess necessary data; to analyze that information and then to answer questions to determine the nursing plan to be implemented in the immediate care of the client. The instructor functions as a facilitator in leading a class discussion of the questions. See Appendix A for an excerpt of example 1.

Example 2

This example looks at a case study / client scenario from admission through discharge. This approach provides a sense of continuity that students may not be able to experience. Due to time constraints, students do not often have the opportunity to see the results of their care implementation. This example uses the students stations in a more interactive format. Students are divided into work groups and given the client information. They are then instructed to analyze the information at different time points in the scenario and to determine appropriate actions. Each group, using word processing on the student computers, answers questions regarding the data and plan of care for the client. Using networking capabilities, each student group's work is then projected to the ceiling-mounted projector and shared with the entire class. Following presentation, the individual group files are merged and printed to provide a hard copy for later study. See Appendix B for an excerpt of example 2.

Example 3

Example three's case study examines a client scenario over a period of years. This example allows the students to look at the chronicity of a health care concern. This implementation also combines an additional interactive technique - role playing. The scenario begins with randomly choosing three students. These students "play the role" of the client at three points in time. These students are given information about the client and the remaining students are divided into three groups. This example integrates three different aspects of nursing care - obstetrical care, home health care and acute care. Each group is instructed to interview the "client"; gather necessary information from the client's chart documentation, and plan a strategy of care. As with the example two, the finished work of each group is then presented on the ceiling-mounted projector and shared with the entire group. A hard copy is then produced for further study. See Appendix C for an excerpt of example 3.

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Example 4

This example describes a cooperative learning strategy as students are instructed to develop their own case studies/case scenarios. After dividing the class into small groups, each group is instructed to review the textbook information concerning an assigned endocrine disorder. Each group then develops a client profile detailing the common characteristics that a client with that disorder would demonstrate. After describing the data appropriate to its "client", each group provides information as to the medical therapy and the nursing plan of care appropriate for the client. Again, each group presents its case to the class and a hard copy is produced for study purposes. See Appendix D for an excerpt of example 4.

Conclusion:

The use of technology to implement a case study approach to learning has many benefits. These include: (1) an interactive approach - students can take an active part in their own learning and in sharing that information with classmates; (2) a critical thinking approach - students are able to analyze data to determine actions; (3) an extension of available clinical situations - instructors can supplement experiences that may not be available or practical in the clinical setting; (4) practical experience in computer use and group presentation; and (5) facilitation of group interaction.

While a case study approach to learning can be accomplished without the availability of the "master classroom" instructional technology, its availability enhances implementation of the approach and improves the way that information is shared in the classroom setting in a timely manner.

Master Classroom Technology

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Appendix AExcerpt from Case information for Example 1:

Mr. Shipp, a 72 year old retired construction worker, was admitted through the emergency room with the medical diagnosis - Acute Exacerbation of Chronic Obstructive Pulmonary Disease. Since his admission his respiratory distress has increased, his oxygenation status has worsened, and his work of breathing is rapidly leading to fatigue.

Assessment data and the medical plan is given.

Answer the following questions concerning Mr. Shipp:

1. What evidence is there to support the possibility that Mr. Shipp is developing Acute Respiratory Failure (ARF) ?
2. If you agree that he is developing ARF, what type: Ventilatory Failure, Oxygenation Failure, or a combination of both etiologies ?
3. Is intubation warranted? If so, what equipment should be available and what initial assessments should you plan to complete ?
4. Determine the highest priority nursing diagnosis appropriate for Mr. Shipp's plan of care. Be sure to complete the diagnostic statement with the explanatory related to, secondary to and defining characteristics components.
5. Develop the plan of care for the diagnosis by determining two short term outcome criteria (specific and measurable) and two nursing interventions.

Appendix B

Excerpt from Case information for Example 2 (Adapted from Lowe, A. & Melander, S.D(1996). PTCA and thrombolytic therapy in myocardial infarction. In Melander(Ed.) Review of critical care nursing: Case studies and applications (pp. 50 - 53.) Philadelphia: W.B. Saunders.

Mr. Smith, a 54 year old male, began having chest pain at work 1 hour after lunch. He described the pain as a "grabbing pressure" located midsternally. He rated the pain at "about a 4" on a scale of 1 to 10. He stated that the pain radiated down his left arm and through to his back. On admission, after transportation to the emergency department via ambulance, Mr. Smith was pale and diaphoretic and complained of shortness of breath. He denied nausea or vomiting. He was diagnosed in the ED with unstable angina, and with a myocardial infarction to be ruled out. On arrival in the ED at 12:50 p.m, he had experienced chest pain for 1 hour. The patient reported no previous episodes of chest pain or pressure. He smoked two packs of cigarettes daily for 25 years. His mother died of Alzheimer's disease and his father died of cancer. There is no family history of heart disease.

On initial examination, the patient did not exhibit jugular venous distention (JVD), the carotid pulses were 2+/4 without bruits, and point of maximum impulse (PMI) was located at the 5th ICSMCL. Normal S1 and S2 sounds were auscultated with an S4 present. No S3 sound or murmurs were heard. There were vesicular lung sounds with scattered wheezes, but no crackles were heard. No edema was present and bowel sounds were normal. Admission diagnostic data was given:

In the ED, Mr. Smith's chest pain was unrelieved after three sublingual nitroglycerin (NTG) tablets. Morphine sulfate 5 mg IVP was administered, resulting in a small decrease in pain. After evaluation of the initial laboratory results, presenting symptoms, and the EKG, the diagnosis of an extensive anterolateral myocardial infarction was made. Mr. Smith was assessed for contraindications for thrombolytic therapy. The patient was considered a candidate for the thrombolytic therapy and tissue plasminogen activator (tPa) was started immediately. The patient was then transferred to the coronary intensive care unit. In the CCU, Mr. Smith's chest pain returned at a rating of 7. After 1.5 hours of tPa, his blood pressure was 96/60 mmHg. A sublingual NTG was given, but the pain did not decrease. The EKG showed no change. Mr. Smith was sent to the catheterization laboratory for an emergency cardiac catheterization and possible percutaneous transluminal coronary angioplasty. Cardiac catheterization showed 90% blockage of the left anterior descending artery and an emergency rescue PTCA was performed.

Answer the following questions concerning Mr. Smith's case:

1. Explain the use of the medications in this scenario (Give drug classification and rationale for their use in this scenario.
5. Determine the nursing diagnosis of highest priority on admission - complete with long term goals, short term outcome criteria and appropriate interventions.
6. Determine the nursing diagnosis of highest priority following PTCA - complete with long term goals, short term outcome criteria and appropriate interventions.
7. Consider the psychosocial impact of Mr. Smith's cardiac event and list interventions that are directed toward assisting him to learn and cope with life style changes that are indicated post discharge.

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Appendix C:Excerpt from Case information for Example 3

Three students are chosen at random to role play the part of the client and the remainder of the class is divided into three groups. The following information is given. Instructions to the "Client" - Review all three stages of the client case. Be familiar with the medical history that the case presents. You may feel free to improvise with personal data as long as it does not change the outcome of the case. During the interview process, do not just read the data as given; answer the questions offered by the interviewers. If there is data that the interviewers do not ask for - you may give hints. If asked for definitive data, i.e. labs, dx tests that are not in your information, respond that that information is not available. If asked for physical assessment data that is not provided, you may improvise. Help direct the group members to focus on the outcome of the case : Part I - acute renal failure with the underlying precipitators of Lupus, post partum RBC hemolysis with the HELLP syndrome, and hypovolemia; Part II - Chronic renal failure with CAPD; Part III - Chronic Renal failure with transplantation.

Client profile Case Study Part I: You are Julie Morrow a 24 year old female with a 3 year history of Lupus erythematosus. Julie is two days post-partum following an emergency C-section. She was 34 weeks pregnant and had difficulties throughout the pregnancy with pregnancy induced hypertension. On admission, she was diagnosed with HELLP syndrome and the emergency delivery was performed. During the delivery, she became hypovolemic following massive bleeding and developed hypovolemic shock. Assessment data and the medical plan is given.

Client profile Case Study Part II: Ten years have passed; Julie Morrow is now 34 years old and has experienced declining renal function since the delivery of her child. The diagnosis of ESRD has been made and it has been determined that long term dialysis will be needed. A Tenckhoff catheter was placed and CAPD begun. You are now home and preparing to do the dialysis installation and exchange for the first time at home. A Home Health nurse is present to complete an assessment and assist you with the procedure. Assessment data and the medical plan is given.

Client profile Case Study Part III: Two years have passed; Julie Morrow is now 36 years old. She has followed the medical plan with the common problems and has been waiting for a renal transplant. She wears a beeper and remains in contact with the transplant procurement team. Last night she was called and told that a compatible kidney had been found and she was chosen as its recipient. She went immediately to the hospital and has undergone transplantation. She has now entered the SICU following the surgery. Assessment data and the medical plan is given.

Appendix D:
Excerpt of Case Information for Example 4 :

After dividing the class into six groups, randomly assign the following endocrine disorders: Diabetes Insipidus, Syndrome of Inappropriate ADH, Thyrotoxicosis, Myxedema Coma, Diabetes Mellitus in Ketoacidosis, and Hyperglycemic Hyperosmolar, Non-ketotic Coma. Instruct each group to develop a client profile and case study detailing a client history (include the underlying pathology, etiology of the current state, assessments that would be expected), client profile (current assessment, lab data, diagnostic information), and the highest priorities in the immediate nursing plan of care. Following development of each case study / client scenario, each group will present its case to the class. Following presentations a hard copy will be produced for all class members.



Track Sessions



Track 1: Technology and Pedagogy Business



Mid-South Instructional Technology Conference



Technology In the School of Business Curriculum

The Critical Importance of Technology Integration In the Business School Curriculum

How Christian Brothers University Is Meeting This Challenge

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ABSTRACT

Higher education institutions today are integrating information technology into the business school curriculum. The issues driving this integration and the underlying importance of a successful implementation are the focus of this paper. How Christian Brothers University developed from vision to implementation is presented. The importance of a proper foundation in the core business curriculum and the subsequent *threading* of this foundation throughout the entire fabric of the business school is developed and explained. This core foundation, based upon technology trends, is a key component for success. Other factors leading to a successful implementation are listed. Finally, recommendations are presented to aid in the integration of information technology into the business school curriculum.

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The Critical Importance of Technology Integration in The Business School Curriculum

How Christian Brothers University Is Meeting This Challenge

The April 13, 1992 cover story in TIME magazine opened with this prediction for American institutions of higher education:

By the year 2000, American colleges and universities will be lean and mean, service oriented, and science minded, multicultural, and increasingly diverse--if they intend to survive their fiscal agony.

Coupled with that prediction, HEIR (The Higher Education Information Resources Alliance) added yet another challenge: "Like it or not, prepared or not, our institutions of higher education are entering the information age." (HEIR. Report#1:1). It was precisely that future vision that led Christian Brothers University and its School of Business to adopt a concept and a plan designed to picture and to prepare itself for this future.

Christian Brothers University

Christian Brothers University was founded November 19, 1871, by members of the Institute of the Brothers of Christian Schools, a Roman Catholic religious teaching congregation. The university offers baccalaureate degrees in Business, Computer Science, Engineering, Liberal Arts, and Science with graduate level degrees in Business, Engineering and Education. The institutional mission of the university emphasizes excellence in teaching and individualized

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attention to the whole person in a values oriented, inter-faith educational community. The university prepares students for professional careers and advanced study in the arts and sciences, engineering, and business, and for lives of moral responsibility and constructive community involvement. (Christian Brothers University, 1995-96)

School of Business

The School of Business is organized into four departments, each with its own Chairperson. These Departments are: Accounting; Economics and Finance; Management and Marketing; and Information Technology Management. The graduate offerings include a Masters of Business Administration degree with seven options: Accounting; Finance; Health Care Management; Information Technology Management; Marketing; and a general MBA. An Executive MBA with options in Information Technology Management, Health Care Management, and Strategic Management is also offered.

Students in the School of Business

The School of Business is the largest school of the university representing approximately 51 percent of the students enrolled at the university. The school has a daytime program comprised primarily of traditional first-time students. A large Evening School serves what is characterized as the "adult student" consisting of already employed persons working on an initial degree or taking preparatory courses to qualify for advanced degree programs. The breakdown of these students is shown in Table 1-School of Business Student Enrollment:

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Table 1 - School of Business Student Enrollment - 1995-96

School of Business Student Enrollment-1995-96				
Major	Total Day	Total Evening	Total All	Per Cent
Accounting	75	88	163	26%
Economics/Finance	40	37	77	12%
General Business	18	22	40	6%
Information Tech. Mgmt	48	88	136	21%
Management/Marketing	79	107	186	29%
Unspecified Business	34	3	37	6%
Totals	294	345	639	100%

Source: Christian Brothers University; Office of Institutional Research,
Majors by Year Statistics, 1995-96.

Technology Awareness of Students

A survey was conducted in 1991 (Wade, 1991) to assess student understanding of technology and its potential benefit *as they perceived it*. Appendix A contains a sample of that survey form along with the result. What was learned was that our students were highly computer literate and more than 65% of them owned or had access to a personal computer. More important perhaps, 94% believed that their career objectives would be enhanced by having increased knowledge of the proper use of personal computers. The School of Business began to develop a vision designed to move the school into the technology age. Building upon the experience gained with the earlier establishment of The Center for Telecommunications, the school rapidly positioned itself to offer additional degrees in technology and to insure that technology facilities were a major part of the planned construction of a new facility.

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The Technology Plan-Facilities

With the occupation of a new multi-million dollar facility for the School of Business in 1992, the business school began to quickly implement the technology plan incorporated in its vision. Three fully equipped computer classrooms are now available in this facility providing networked terminals for each student. An instructor podium with full control of the multimedia available in the classroom as well as a teaching terminal are provided.

Further multimedia capability includes ceiling mounted overhead video projectors. These projectors are networked to allow instructor selectable transmission of computer output from the instructor computer console, as well as outputs from video or audio tapes, viewing of television satellite transmissions, and transparencies. Two auditoriums in the facility are similarly equipped to provide an opportunity to host large group presentations. In addition the facility has a well equipped groupware lab/classroom, a distance learning center classroom with the capability for live broadcast to an off-site location as well as receiving broadcasts from other similarly equipped classrooms. In addition to those facilities, several case study classrooms are permanently equipped with console podiums that offer computer, video, audio and satellite links to multimedia viewers/projectors for display to the entire class. A rolling cart with a multimedia computer and attached video projector is available to faculty for use in classrooms not equipped for multimedia. For development of faculty presentations a multimedia center was added and is now available for faculty use. This center contains a multimedia equipped personal computer, fax machine, scanner and laser printer. It is open to all faculty at any time. In addition each

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faculty member has a personal computer available in their office. Through networking of these faculty computers access to e-mail, the *Internet* and other campus facilities such as the library and computer center are easily accomplished.

The entire campus is networked via fiber optic links. Students have access to e-mail, the *Internet*, and other resources via this campus network, or from home via modem. The computer center offers students access to a variety of on-line research materials, general software in support of word processing, spreadsheets, accounting, databases, statistical analysis, and the *Internet*. Access to this facility is available to students in excess of 80 hours each week. The *Plough Memorial Library* has additional computer terminals available for research, CD-ROM databases listing current periodical and other research databases, and the library catalog which is on-line and available over this same network.

The Technology Plan-Curriculum

CBU requires a 43 credit hour liberal education core curriculum for all students enrolled in the university. The School of Business requires a core business curriculum consisting of another 42 credit hours. The general core requirement is based upon a strong liberal arts concentration in English, Math, Social Science, Natural Science and Religion. The planning worksheet included in Appendix B gives the reader a more detailed example of these requirements. Understanding of the business core concentration is important because it is in these *core areas* that the reinforcement of technology is properly integrated and implemented. If the overall goal is an informed student then all department must be involved.

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The concentration in the business core is divided into five key areas. These areas are presented in Table 2 - Business Core Curriculum Requirements.

Table 2 - Business Core Curriculum Requirements

CORE CURRICULUM HOURS - BUSINESS CORE	
Information Technology	6 Credit hours
Accounting Principles	6 Credit hours
Business Law/Statistics	12 Credit hours
Economics/Finance	9 Credit hours
Management/Marketing	9 Credit hours

Source: CBU 1995-1996 Catalog:p. 7

The use of the facility to empower technology and the companion emphasis on curriculum was extremely critical to the stated vision of the School of Business. That vision was to produce business leaders with strong technology *awareness*. In order to assure that this awareness was properly placed, it is important to state and to understand the role played by key technology threads that exist throughout the business curriculum. It is not enough to develop technology skills which students use in the major fields of study. They must possess a keen awareness of appropriate selection of technologies to be used in a particular business situation. It is the understanding of this need for awareness and the application of that awareness to business problem solving thorough appropriate use of technology that enables the business school to best prepare students for success.

Technology Trends - How They Guide Response

John Scully, former CEO of *Apple Computers*, wrote this introduction to a well known book on technology:

I believe the world is going through a fundamental change. This poses a formidable challenge to educators - teach the rest of us to cope with the acceleration of knowledge and especially teach young people (who are going to spend the majority of their lives in the twenty-first century) the process of learning. (Poppel and Goldstein, 1987:xi)

What are these *fundamental changes*? How do they influence and affect the business school curriculum? What should faculty do to prepare themselves and their students for this information age? To understand this and to formulate an appropriate response one must clearly understand how major technology trends affect what business enterprises demand from technology, why they demand it and how technology potentially answers those demands.

It is appropriate at this point to define the phrase *information technology*. A definition often used in my classes was first introduced by Poppel and Goldstein. They defined information technology as "the use of computers and telecommunications to create, manipulate, and distribute enlightenment and entertainment. Information technology is an increasing pervasive and powerful life force. At times a stimulant, occasionally an irritant, and too frequently a tranquilizer" . (Poppel & Goldstein, 1987:xv,xvii)

In my classroom experience with students they are inclined to view technology as a stimulant or as entertainment rather than as enlightenment. Our challenge, as educators, is to increase the level of student awareness to a recognition of the importance of *enlightened* use of

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technology. All too often students are simply exposed to technology as a *skill* to be acquired as opposed to a *learning tool* in support of a particular business decision process.

This concept of providing critical thinking by way of technology enlightenment is central to a successful technology curriculum. John Scully was correct when he identified the "*process of learning*" as a principal key to the twenty-first century. Poppel and Goldstein also define the technology industry as having a supply and demand dimension. (Poppell and Goldstein, 1987) It is important to insure that students understand this and do not view technology simply as a personal computer with software. An example of the industry they envision might look like the model shown in Fig. 1 - The Technology Industry.

THE TECHNOLOGY INDUSTRY

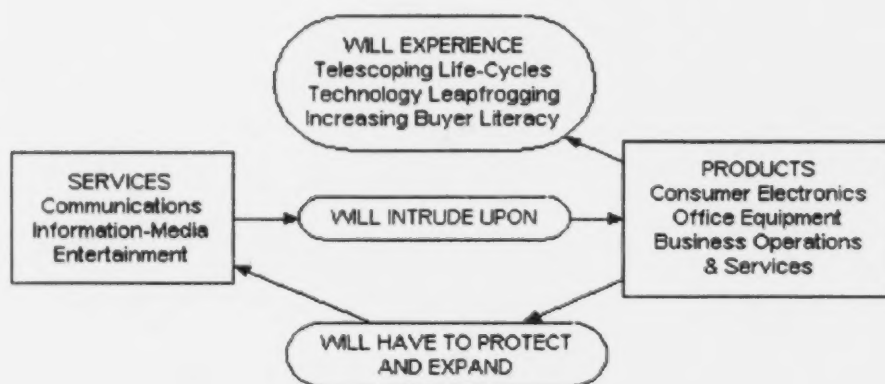


Fig. 1 - A Potential View of the Technology Industry

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Considering the supply and demand side of the industry the students should be led into an understanding of the reasons why business is often slow to embrace technology as a cure-all for their problems. Some potential reasons for this are:

1. Lack of proper functionality of available products/services
2. Too expensive a solution for perceived benefit
3. Incompatibility of hardware/software or other services
4. Belief that only technicians can understand and use technology solutions
5. Fear, uncertainty and doubt (FUD) - the intimidation factor.

Classroom discussion of these key issues and building a curriculum to help overcome popular misconceptions about technology are very important. The simple introduction of technology (skill) in the classroom, in and of itself, is not adequate. The business issues of technology must be strongly threaded throughout each of the business school disciplines in order to prepare students for success in using technology wisely.

Technology Trends-What Are They?

In most discussions regarding technology today students anticipate that the topics covered will include such modules as discussions of networking, operating systems, hardware and software, programming languages and other similar technical topics. While these are certainly important, and should be included, it is my belief that in the business school curriculum the presentation of technology must have an established foundation. This *bedrock* foundation must be based upon *business not technology*. There needs to be a clear understanding by the student that the technology industry consists of more than personal

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computers and software. A method appropriate for this is a clear presentation to students of major trends driving the development of information systems in today's business enterprise. This foundation, if applied in the beginning core computer concepts course, will prepare the student to understand how application of technology to business problems is strategic.

Infotrends-The Business of Technology

There are five general infotrends as identified by Poppel and Goldstein. (Poppel & Goldstein, 1987) The proper presentation and classroom discussion of these major trends will allow students to grasp (without prior business experience) what is driving business to turn to technology as a tool for business strategy and asset development. The trends help explain how technology has matured from a pure business expense (being used primarily for accounting record keeping) into a strategic business partner used to enhance and support the generation of profit or services. This understanding of the maturing of technology should be included in the core course content so the students can understand how business is being altered as information technology use expands and improves. The infotrends are identified in Table 3.

TABLE 3 - Poppel and Goldstein's Infotrends

POPPEL & GOLDSTEIN'S INFOTRENDS	
I.	GLOBALIZATION
II.	CONTENT
III.	DISINTERMEDIATION
IV.	INTEROPERABILITY
V.	CONVERGENCE

(Source: Poppel and Goldstein, 1987:p4)

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It is beyond the scope of this paper to describe the Infotrends in detail. However, it is appropriate to present a quick overview. To paraphrase Poppel and Goldstein's view on the infotrends:

Globalization

Information technology is a cause and an effect of global markets. The advent of the technology age has meant increased leverage for business organizations with international aspirations and connections. The idea that a company can ignore this trend and be successful is rapidly disappearing. The popular phrase today is that we are living in a "wired world."

Content

Content consisting of software, databases, and expert system support services is gaining strategic value at the expense of facilities, computer power, storage and bandwidth. In this one area, as perhaps in no other, the dollar cost savings of information technology are apparent. The replacement of human tasks of drudgery with computer efficiency is well understood. What is now becoming better understood as well is the use of computer databases (content) to increase company profitability. The mining of data as an asset of the company has increased the executive perception of information technology and moved information aware professionals into the executive suites of most large companies. Content is the driving force behind many new ventures being undertaken in the information rich world of the present.

Interoperability

The ability of two or more parties, machine or human, to make a perfect exchange of content is a proper definition of interoperability. "Perfect" must then be defined as exchanging

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content with no perceptible distortion nor unintended delays between content origin, processing and use. This implies such a transfer must take place between physical and logical components of the information processing system. It transcends hardware, software, procedures, data, and people. Interoperability may be the one remaining challenge to be overcome in the unparalleled explosion of information technology in business.

Disintermediation

Disintermediation implies that markets will attempt to minimize the number of intermediary stages between buyer and seller. This is leading to massive restructuring of the manner and the alliances which businesses once maintained. Mergers and consolidations for the sake of new skills, new research, new markets, new talents, and the like are becoming commonplace as businesses attempt to position themselves to challenge each other in an increasingly competitive global economy. It has been widely speculated that today's college graduates will change jobs approximately six to eight times in their lifetime. A number of these job changes will be due to disintermediation and convergence. This trend is not only appropriate as an infotrend, it is absolutely essential for the future well being of the student who must understand what the future holds and how they must prepare for that future.

Convergence

Convergence is the ultimate result of the other four trends. It enhances the blurring of products and services, content and facilities, home and business uses of technology, the merging of information and entertainment. Another appropriate word for convergence might be consolidation or merger. The constant restructuring of business today with downsizing,

rightsizing, then resizing to meet the challenge of competition will force many students to seek more education throughout their working lives. Properly placing the importance of information technology as both a cause and effect of convergence is reason enough to expose students to these concepts. (Poppell and Goldstein, 1987)

Infotrends and the Curriculum

The real purpose of this discussion of trends is to insure that curriculum at the "core level" supports the incorporation of this kind of material. It facilitates student understanding of technology in a *business way*. Technology should be presented in the business core as a means to an end, not as the end. Skill training is not appropriate to this context. Learning to reason, to support, and to enhance one's critical thinking processes is the purpose of technology in core courses. Any *skill* acquired "along the way" is simply an added benefit. However, proper application of technology and its mastery should enable students to acquire additional needed skills on their own. Little class time should be devoted to acquiring specific software skills or sponsoring keystroke driven training as these can be mastered as needed. Accordingly, the core curriculum at CBU has been designed with this concept in mind. We do not teach skill driven classes in the software we provide: *Microsoft Word*, or *Excel*, or *Access* or *Peachtree Accounting*. Rather we expose students to the proper *application* of text processing, of spreadsheets, databases, and electronic accounting, statistics and other available software presented as solutions to business problems. Once these core applications have been presented it is equally important to carry forward the use of this newfound application of technology into

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other higher level (and discipline intensive) courses. It is in this area that departmental collaboration and understanding of the importance of technology must weave itself into the fabric of the entire business curriculum. The understanding, application, and implementation by all departments of this central theme is critical to the success of the business school if it is to prepare students for proper entry into an technology driven business environment.

CBU's Implementation of Technology In The Business Curriculum

At the freshman level all incoming business majors must take two core information technology classes These are:

CIS 152 - Introduction to Computer Systems

CIS 153 - Microcomputer Applications

The first course, CIS 152, presents an overview of computer information systems, defining the elements of hardware, software, people, data, procedures and how they must be properly integrated to be successful. The first application of computers in text processing and graphics is taught using *Microsoft Word* and *Microsoft Power Point software*. Application of technology is stressed versus skill training. Basic research is required on the *Internet* using personal computer terminals to develop a research paper using the tools provided. The idea is to insure a base level for all students in the terminology of technology, the application of technology, and understanding its importance in whatever their major field of study happens to be. Students are told that the use of tools they are learning will be used throughout their course work in their major field of study.

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The second core level course, CIS 153, is designed to provide practical application of information technology to solving basic business problems. It is intended to provide a working knowledge of the application of personal computers to business problem solution using spreadsheets and databases. The integration of both of these with text processing and graphics (for presentations) is also stressed in order to link the two core courses together. Again, it is important to stress to the students that what they are learning will be utilized throughout their academic life and later in their chosen career. This is the proper place for the "enlightenment" concept previously mentioned to take place. If technology is to be used as a creative tool then students must learn this now, in this core curriculum offering. That is why all business students are required to take these two courses.

Beyond the core level, each department in the School of Business, has introduced other key technology-driven modules. These modules are to reinforce and stretch the core concepts learned in the introductory classes. Some brief examples of how this is done is presented in the following departmental summary.

Accounting

The Accounting Department requires all accounting majors to learn (on their own) to utilize an accounting package (currently *Peachtree Complete Accounting III*) as an example of the electronic posting of accounting records. This is stressed in basic and intermediate accounting courses. Limited classroom time is involved in teaching software and the students are expected to complete their assigned accounting homework working in the student labs. This enables the accounting faculty to contrast the basic principles of accounting learned in the

Technology In the School of Business Curriculum

manual posting of accounting worksheets to the time-savings and other advantages potentially available through the use of electronic posting systems.

In other accounting courses, for example Federal Income Tax, the use of technology is enforced through requirements that the students utilize lab software for tax research as well as the actual creating of tax returns using tax preparation software. In the auditing theory course the student is given an extensive audit research case to complete. This case involves using database software to develop and build audit evidence, conclusions, and reports. A copy of the current *Auditing Research Project* case document student handout is included in Appendix C. One testimonial to the success of this approach is the high performance of CBU accounting graduates on the CPA exam, which demands a strong understanding of the role and the practice of technology in accounting today.

Economics and Finance

The use of computer software in the Economics and Finance Department includes frequent student case assignments which utilize computer modeling and student development of supporting spreadsheets and/or databases. The regular use of EUS (*Execustat*) and SPSS statistical software is expected in completion of student projects. Databases are built in economics classes by first defining and then designing the basic research required to retrieve needed data. The *Internet* provides students with access to *EDGAR* and other business databases. They can also look at company annual reports in the CD-ROM databases in the library. Finally, presentation software is required to build the case presentations for viewing by the entire class.

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Management and Marketing

The primary use in this area is the development of research supported by appropriate graphics and presentations. Frequent use of the *Internet* and business databases is required for homework assignments. *Power Point* and *Freelance Graphics* (both available in student labs) are requirements for most student case presentations. Students are expected to make quality *business oriented* presentations. In addition computer business model simulation software is used in business policy and selected other management and marketing courses.

Information Technology Management

The foundation built in the core curriculum is also important to the information technology student. CBU offers two tracks in this department - a management information systems track and a telecommunications track. The MIS track focuses on systems analysis and design, database design and object oriented analysis and design. The telecommunications track includes networking, telephony, satellite and other telecommunications courses. A programming language is required in both tracks. A newly created group processes course prepares the student for collaborative computing with its focus on group decision processes, group decision software applications and workgroup design and implementation. A course offering for senior level students is *Information Technology Management*. Here students focus on the vision, strategy and implementation of technology solutions using the discussion case study method. Students analyze, discuss, and critique various approaches taken by business enterprises to resolve technology driven challenges. This course is designed to apply their learned experiences to real world experiences.

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In a recent article written to alumni of the college, Dr. Joseph Morone, Dean of Rensselaer said:

Most business schools are obsolete. The curriculum is the same old, same old. The major criticism of business schools everywhere is that their academics work on questions no one cares about. Technical ability alone will not cut it. The businesses that will succeed will be those managed by technologically astute men and women who have learned how to convert technology into profitable new products, processes, services and business ventures. We need a new kind of business school, a school that integrates management and technology. We need to *focus and lead*. (Adams, 1995:18)

Focus and Leadership

Dr. Morone has captured the essence of the challenge--*focus and leadership*. The most pressing problems today involve overcoming the resistance to change on the part of many business school faculties. At CBU the vision and the architecture of that dream has been in place for approximately five years. At the risk of oversimplifying requirements I would offer a simple checklist of requirements for the effective use of technology in the business school:

1. Understand technology trends - make them a part of your curriculum..
2. Empower the faculty to explore technology as a collaborative effort.
3. Provide adequate resources - for faculty and students.
4. Emphasize flexibility in the design of courses; all departments must cooperate and support the basic technology threads in their areas.
5. Stress simplicity - Avoid over-structuring of the curriculum.

6. Never forget the basic foundation, the *bedrock* philosophy which serves as a constant underlying premise. The business school is first, *about* business, not technology.

Or, stated in an overly simplistic but nonetheless effective cliché':

We must not forget our basic A. B. C's.

"A" for Access (to facilities and to adequate funding)

"B" for Brotherhood (at Christian Brothers, the business faculty is both collaborative and cooperative)

"C" for Content. (build on business basics, then weave in technology)

As for successful implementation of these tasks I can only add to what Dr. Joseph Morone has already so eloquently stated: (Adams, 1995)

Focus and Lead

Those are the keys to a successful implementation of technology in the business school. Students must *focus* on the true value of technology, not on the technology itself. Faculty must be carefully *led* into an understanding of how intra-discipline collaboration empowers students to see technology as a business tool versus a skill. Administration must provide *leadership* in the form of adequate funding and support for the successful integration of technology into the curriculum. Given this scenario the business school can confidently approach its future with pride and determination that it is serving both the business community and the students it has a responsibility to serve. At Christian Brothers University that strategy is well established and working daily to serve those constituents.

Technology In the School of Business Curriculum

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Notes:

PowerPoint and Microsoft Word are registered trademarks of Microsoft Corporation.

EUS, and *SPSS* are registered trademarks of their respective companies.

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APPENDIX A

Chart I - Christian Brothers University-Survey On Information Systems

Instructions: Please answer EVERY question according to your own experience and beliefs. Thank you for your participation in the survey.

Please carefully read, then answer each question. Check one box only. Agree Disagree Not Sure

Personal Computers (PC's) greatly increase my ability to learn while at CBU.			
Effective use of personal computers is critical to my future job role (assuming my current career choice).			
I have a great deal of personal experience (outside CBU) with a personal computer.			
I have a great deal of personal experience with a mini- or main-frame computer.			
I completed at least one course in computers while in high school.			
Computers and the teaching of computer applications like Lotus 123 or dBASE are important to the graduates of CBU since computers are so predominant in business/government today.			
I have a working familiarity with spreadsheets, database and word processing software on a personal computer.			
I have a personal computer at home, in the dorm, or available to me at my place of work.			
How often do you use this outside computer? Put your answer in terms of number of times per week in the first column.			
Are you familiar with (do you understand) the term "networked computers?"			
Do you understand the term "telecommunications?"			
Do you currently subscribe to an online service such as Prodigy, Dow Jones or CompuServe (or equivalent)?			
Have you ever used the CBU library computer terminal to look up a book by subject, title or author?			
Have you ever used the CBU CD-ROM system terminal to find an article in a periodical?			
If you could dial up the CBU library system(s) and connect via a modem to your own personal PC how often would you use that to search for books or periodicals? Place your answer in terms of times per week in column one.			
Considering the current on-line catalog system at the CBU library do you feel it is superior to the old manual system?			

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If you had access to a CBU campus-wide electronic message/mail system for sending and receiving messages from faculty, staff, or students how many times would you estimate you would use it weekly? Place answer in terms of times/week in column one.			
Have you ever used a facsimile (FAX) system to send a document to someone?			
If you could dial into a CBU network and transmit a document by FAX to faculty, staff or students, how many times/week would you expect to use such a system?			
Please list in the three columns your first, second and third choices for items you would submit on the FAX network. (Examples: homework, forms, notes, mail, etc.)			
Would computers available in the dorm areas be useful?			
What do you think of requiring EVERY student at CBU to have a personal computer (many schools do so today.)			
Do you think a student electronic bulletin board system (for meetings, messages, rides, etc., would be useful to you?			
Do you feel it is important to have CBU on a national network with other colleges and universities?			
Since CBU offers telecommunications degrees, do you feel it important for us to have a campus wide network of computers?			
Do you have access to computers as often as you need them through the computer center, K107, or other on-campus facilities?			
Would you rate CBU in terms of computer facilities as satisfactory considering the size of the institution?			
If your answer in the previous question was NOT strongly agree, please describe in the space below your own thoughts as to what is needed to bring CBU up to your expectations?			

What could be done? _____

Please use the remaining space for any comments you would like to make on this survey or any other subject you feel is appropriate to the topic of computers and telecommunications at CBU. Use back of form if necessary.

Chart II - Detailed Survey Results

- I. Total number of students participating: 240
 II. Current Year in School
 20% Seniors
 40% Juniors/Sophomores
 40% Freshmen

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III. Classes Surveyed

Introduction to Computing
 Microcomputer Applications
 Systems Design & Analysis
 Religion and Morality
 Accounting
 Economics
 COBOL Programming
 Evening Program-Various
 Graduate Program-Accounting

IV. Methodology: The questions were next grouped in the response totals to develop the conclusions presented in the body of the report. This grouping was accomplished as follows:

Grouping of Questionnaire Results

<u>Category</u>	<u>Questions Included In Category</u>
I. Career/Future Jobs	1, 2, 6
II. Computer Experience	3, 4, 5, 7, 8, 9
III. Network/Telecommunications Knowledge	10, 11, 12
IV. CBU Library Services	13, 14, 15, 16, 17
V. CBU Electronic Campus Concept	18, 19, 20, 21, 22, 23, 24
VI. CBU Image in Networking, Computers	25, 26, 27, 28, 29

Detail Survey Results By Question/Grouping

QUESTION	AGREE	DISAGREE	UNSURE
Career/Future Job			
1. PC increase my ability to learn	186	22	32
2. PC critical to my career choice	218	12	10
6. PC Applications important	220	4	16
Computer Experiences			
3. Have PC experience	138	68	34
4. Have main-frame experience	84	160	4
5. Completed HS computer course	150	94	4
7. Familiar with SS/DBASE/WP	201	32	7
8. Have my own PC	186	28	26
9. Avg. Times/Week I use my PC	Average of 6.5 times per week		

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Networks/Telecommunications			
10. Understand term network	174	18	48
11. Understand telecommunications	166	4	70
12. Use on-line services	36	202	2
CBU Library Services			
13. Have used library terminal	186	42	12
14. Have used library CD-ROM	126	100	14
15. Have used CD-ROM Disclosure	20	220	0
16. Times I would use weekly			
17. Online superior to card catalog	146	84	10
Electronic Campus Concepts			
18. Times I would use Messaging each week	Average use of 3.5 times per week		
19. I have used a FAX machine	144	66	36
20. Times I would use FAX network	Average of 1.3 documents per week		
21. Top three uses for FAX	Homework	Required Forms	Class Notes
22. Dormitory computers useful	125	70	50
23. Require all students to have a PC	56	111	65
CBU Image Issues			
24. Student BBS-Would it be useful	176	24	40
25. CBU should be on educational networks	205	25	10
26. CBU-network due to degrees offered	210	16	14
27. Present access to computers satisfactory	212	14	14
28. CBU has adequate computer facilities	207	33	10

Question Number 29 asked for comments. Here are some of the more frequent comments.

1. I think the current (CBU) system is a good one.
2. Laser printers badly needed.

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3. Needs to be even more emphasis on telecommunications. It is the future.
4. Computers need to be available on a 24 hour basis.
5. This is the "wave of the future."
6. We all should have our own computer.
7. Need access to computer with on-line capability to Prodigy, CompuServe. Should have free use of machine but be charged for time used.
8. Need to have access to more up-to-date software.
9. Only one scanner on campus. Need more and need access to color printer.
10. Since I don't take computer classes I sometimes feel unwelcome in computer center. Need more help for people like me.
11. Need a campus wide Messaging system.
12. Telecommunications curriculum needs to be more focused on networks versus hardware.

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APPENDIX B

GRADUATION CHECKLIST
CHRISTIAN BROTHERS UNIVERSITYINFORMATION TECHNOLOGY MANAGEMENT
1995-96 (SAMPLE ONLY)

COURSES OUTSIDE SCHOOL OF BUSINESS: (43 CREDIT HOURS)

ENGLISH	ENG 111 COMP	_____ (3)	ENG 112 COMP	_____ (3)
	ENG 211 LIT	_____ (3)	ENG 212 LIT	_____ (3)
OR	ENG 221 LIT	_____ (3)	ENG 222 LIT	_____ (3)
AND	ENG 371 BUS WRITING	_____ (3)		

SOCIAL SCIENCE _____ (3) _____ (3)
Recommended HIST 103/104, 151/152; POL 151/152; PSYC 105; SOC 101/102

MATH MATH 111 APP. CALCULUS _____ (3) MATH 112 FINITE MATH _____ (3)

NAT/PHY SCIENCE _____ (4)
Recommended BIOL 104/Lab; 107, 113; NSCI 111, 115

PHILOSOPHY 323 BUSINESS ETHICS _____ (3) ACCEPT: PHIL 234 OR 220

RELIGIOUS STUDIES _____ (3) _____ (3) SIX HOURS REQUIRED

SPEECH CA 124 _____ (3) FRESHMEN ORIENTATION _____ (0)

SCHOOL OF BUSINESS CORE: (42 CREDIT HOURS)

ACCT 261 PRIN OF ACCT I	_____ (3)
ACCT 262 PRIN OF ACCT II	_____ (3)
CIS 152 INTRO COMPUTERS	_____ (3)
CIS 153 MICROCOMPUTER APPS	_____ (3)
ECON 211 MACRO ECONOMICS	_____ (3)
ECON 212 MICRO ECONOMICS	_____ (3)
BUS 221 ELEM STATISTICS	_____ (3)
BUS 301 BUS. LAW I	_____ (3)
BUS 302 BUS LAW II	_____ (3)
BUS 306 INT. STATISTICS	_____ (3)
MKT 322 PRINCIPLES OF MKT.	_____ (3)
FIN 327 FINANCIAL MGMT I	_____ (3)
MGMT 337 ORGANIZATIONAL	_____ (3)
MGMT 498 BUS POLICY	_____ (3)

MAJOR CORE: (30 CREDIT HOURS)

Varies by major concentration.

FREE ELECTIVES: (16 CREDIT HOURS)

Varies by choice of student.

TOTAL HOURS REQUIRED: 131

APPENDIX C - AUDITING RESEARCH PROJECT STUDENT HANDOUT

This research project consists of using dBASE III Plus (or equivalent database software) and microcomputers in the simulated audit of a company's trade receivable and trade payable accounts. The selected transactions represent an actual business activity of a small manufacturing company that uses Peachtree Complete Accounting III software with its microcomputer. The data files were exported into a dBASE III Plus format for your use in this project.

The following specific steps are to be completed and documented in your written report:

- A. Given the nature of this business and existing data file structures, prepare a detailed audit program for both trade receivables and trade payables.
- B. Define conditions for both receivables and payables that you should consider as errors or exceptions. Create and enter into the data base 50 transactions to simulate the various conditions which you defined and will test. Split your tests equally between the trade receivable and trade payable files.
- C. Specify, in detail, the statistical sampling plan(s) that you will follow in the audit of trade receivables and trade payable. Using the microcomputer, perform one statistical sampling procedure of your own design on each of the two data files.
- D. Complete the following ten predefined steps and identify how they fit within your audit programs.
 - 1. Listing of all transactions in accounts receivable file. (Original file unchanged)
 - 2. Listing of all transactions in accounts payable file. (Original file unchanged)
 - 3. Listing of actual transactions in accounts receivable file with subtotals by customer. (Zero transaction omitted.) [Hash and batch totals before and after deletions.]
 - 4. Listing of actual transactions in accounts payable file with subtotals by vendor. (Zero transactions omitted.) [Hash and batch totals before and after deletions.]
 - 5. Listing of accounts receivable summary information for accounts with balances equal to or greater than \$5,000.00
 - 6. Listing of accounts receivable summary information for every 12th account.
 - 7. Listing of accounts payable summary information for accounts with total purchases equal to or greater than \$10,000.00
 - 8. Listing of all purchases in accounts payable file not paid within 10 days of purchase and listing of all purchases paid within 10 days of purchase.
 - 9. Listing of gaps (missing invoices) in accounts receivable file.

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Audit Project (Continued)

10. Listing of all duplicate invoices in accounts receivable file and listing of all invoices in order for accounts receivable file.
- E. Describe and complete four additional audit procedures utilizing dBASE III Plus (or equivalent) and the receivable and payable data base files.
- F. Explain the advantages and limitations associated with using the microcomputer and database software (dBASE III Plus or equivalent), as general audit software, in this specific simulation.

Your report should identify any specific problems or limitations that you encountered in doing the project, including lack of required computer background. Include in your report copies of any external documents that you used in developing your project. The project will be evaluated based upon your report, overall completeness of activities, and the quality of your analysis.

Source: Professor James Tansey, Christian Brothers University, Department of Accounting
Use: Advanced Auditing Course (CBU, 1995)

ENHANCING TEACHING AND LEARNING IN HIGHER EDUCATION WITH A TOTAL MULTIMEDIA APPROACH

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Multimedia technology has been employed to augment classroom instruction for several years. Some initial success has been dampened as students find that very often multimedia presentations are no more than glorified transparency-based presentations. If multimedia technology is to be successfully employed to enhance classroom instruction and learning, the full capabilities of the technology must be used. The complete power of multimedia includes high quality graphics and images, sophisticated navigational techniques and transitional effects, appropriate music and sound, animation and, increasingly, 3-D modeling and virtual reality.

An ancient Chinese proverb states:

"If you tell me I'll forget,
if you show me I'll remember,
if you involve me I'll learn."

Classroom interaction between instructor and students can be linked to this proverb as follows: lecture me and I'll forget, use multimedia technology in the "glorified transparency mode" and I'll remember, employ the full features of multimedia technology in the classroom and I'll learn. Since the de facto goal of the classroom process is for the instructor to teach, and for the student to learn, it stands to reason multimedia capabilities which enhance the teaching and learning process should be used.

The MIS (Management Information Systems) program in the College of Business Administration at Tennessee Technological University has been using multimedia in the classroom for several years. Faculty members, having experienced the multimedia learning curve, are engaged in a research and development activity the purpose of which is to enhance MIS education. Another goal of the research is to produce tools and methodologies which have general applicability to higher education.

Software authoring tools such as Macromedia's Director and Oracle's OMO have been used to create multimedia software which can be employed in the classroom and by the student in the one-on-one tutorial session mode. The classroom software, designated The Interactive Presenter, has been designed for the entry level MIS course required of all College of Business students and has been tested in the classroom and at professional meetings. The primary goal of the prototype software is to provide a high level of interaction between instructor and students within the context of multimedia presentation employ the full power of multimedia technology. Periodically, questions are displayed on the screen, and the instructor queries students for a response. Based on student response, the navigational stream of the software takes the audience to an appropriate visual and audio feedback segment of the presentation. The software is designed to be user-friendly, interactive, and instructional. Presentations to date have validated that research goals have been met.

A second multimedia-based software tool prototype is being developed. This software would reside on a CD-ROM and would supplement the course (MIS) textbook. This software, called The Intelligent Tutor, is artificial intelligence as well as multimedia-based. Students using The Intelligent Tutor would have a personal tutor and progress tracking capability as expert systems software is integrated into the interactive process. The software also creates a virtual classroom environment which can be viewed as the teaching-learning environment of the future.

Feedback has been very positive on the two multimedia-based software tools developed. Students, and audiences in general, enjoy what is being presented and are eager to participate in the process. And as the ancient Chinese proverb states, "If you involve me I'll learn."

Putting the Sizzle

Back Into

Computer Literacy

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Abstract

Computer literacy is defined using the mission of the college or university and the mission of the department that offers literacy courses. In addition, each department within the individual schools should collaborate on developing content and objectives for introductory courses. Various methods and hands-on activities are discussed. Since change is inevitable and ongoing, it is incumbent on faculty in higher education to share tools and ideas that foster effective teaching and learning experiences for our students.

**PUTTING THE SIZZLE
BACK INTO
COMPUTER LITERACY**

"Many of the changes taking place in our world today are directly related to information technology. A radical shift in information technology has taken place just in the past few years. It is most obviously seen in the burst of attention given to the *Internet*." (Baumann & Flynn, 1996, p.xi) With all these changes, how can faculty keep up with the cutting edge in planning and teaching our introductory courses? There are four main areas to address with regards to teaching computer literacy. They are as follows: establish computer literacy requirements and be willing to re-evaluate them yearly, determine the mix of computer skills in each of your introductory computer classes, work toward building community in each class, and have a long list of practical hands-on activities to enhance class interest.

In most colleges and universities computer literacy is required of all graduates. The content of this literacy and which schools or departments offer courses to satisfy the requirement vary greatly. I believe a first step in defining what constitutes the computer literacy requirement is to examine the university mission and the department mission to establish what end result a graduate is required to meet. At Christian Brothers University, the Information Technology Management department used

collaboration between accounting, economics/finance, management, and marketing in order to establish guidelines for basic computer skills. This yields an approach that is more theoretical than software specific to establish concept learning.

We seek to train business students in their freshman courses to use computer tools and applications that they can employ to solve business problems in upper level courses. In addition, we introduce basic trends in telecommunications: the *Internet*, e-mail, local area networks. Future plans at Christian Brothers support requiring entering freshman to purchase their own computer equipment. The first step should be that each department establish their outcomes for literacy courses and develop means that will measure that attainment. We must all be accountable.

Secondly, evidence at Christian Brothers University supports the improved computer literacy of incoming freshman (Wade, 1991). There is a growing divergence of knowledge that entering freshmen bring to an introductory computer literacy class. When I survey my incoming classes on the first day, I find that approximately one third of them do not own computers, have never used them in high school or on part-time jobs. The remaining two-thirds of students have taken one or more computer classes in high school and have access to a computer at home complete with modem, *Internet* service, CD-ROM player and color printer. This growing disparity makes our job harder. We must incorporate activities that interest and yet motivate "haves" and educate "have nots" to a point that is entry level acceptable.

The third point does not directly involve computer literacy. It is important to

establish the class as a community (Ritschel, 1995). Freshmen and even sophomores come to college with different needs than juniors and seniors. For example they need more frequent exams which cover shorter amounts of material than do upper classmen. This is due in part because it is the method used in high schools. CBU studies show that universities and colleges lose 20-35% of incoming freshman and 18-25% of second year students (Burk, 1996). Raising retention figures for freshman and sophomores is often linked to establishing community.

CBU RETENTION STATISTICS

Freshmen Entering Fall of	Percent Retained
1992-93	54.9%
1993-94	67.5%
1994-95	68.7%
1995-96	89.7%

As you can see, CBU's efforts to raise retention rates are very successful (Burk, 1996, p.2) The techniques discussed on previous pages really work.

I recently attended a conference at the University of South Carolina, Columbia, South Carolina. The conference was titled "The Freshman Year Experience". The information I gained is invaluable. A few of the more important conclusions were: establish a center for freshmen advising; provide tutoring centers for subjects such as math and English; offer sessions on how to study, how to take notes, and how to take

tests on different course content, i.e. math, history, biology.

"How can we claim that a primary focus of lower division courses is on teaching if many of our instructors ignore more effective means of enabling students to become better learners?" (Ritschel, 1995, p.18). I believe that until group-building, team-building, or community establishment takes root in our classes, nothing else we do will help students to progress toward the objectives we set for our classes.

Below is a list of suggestions that have been successful in my introductory classes. Practice techniques that encourage cooperation and community among students.

- try to find out about each student's learning styles, interests, or backgrounds at the beginning of each course.
- learn students' names as quickly as possible.
- ask students to learn each other's names.
- ask students to tell each other about their interests and backgrounds.
- encourage students to do projects together.
- ask students to help one another in class with learning software techniques.
- encourage students to ask questions.
- try to be supportive of a student's success, however small.
- be available for help outside class.

Even small efforts in the area of building community reap large returns. (Gardner,

1996).

If you have established computer literacy requirements, surveyed your classes as to their background computer skills, and started building community in each class, you are ready to incorporate hands-on activities that put **SIZZLE** in your introductory computer literacy classes.

There are specific activities to accomplish these objectives. First take your introductory computer class to the library at the beginning of the semester to learn how to use the computerized library facilities. This may include online searches for library holdings or using CD-ROM databases to search for current periodicals and articles. Include "how-to" instructions for using the library's computer equipment and directions on how to dial into the library from an on or off-campus computer. It is imperative that students learn to search databases and assimilate information to be successful in other classes. However you accomplish these tasks is not critical, but making sure you do them is important to the successful literacy of the student.

Another activity is a direct result of CBU requiring writing across the curriculum. Students in my classes must locate an article about some aspect of computers, read it, summarize it, and hand in a one to two page report followed by their opinion of the information. These are due weekly. Students discuss their article in class. This builds community and serves as a learning tool for them and for me. Student evaluations indicate that this exercise more than any other builds the habit of reading journals, magazines, and other library resources.

The remaining suggestions have been grouped into these areas: hardware activities, software activities, and other activities.

Hardware activities

- take apart a telephone and study the parts
- discuss analog and digital signals
- meet in the engineering lab and let students speak into a microphone and observe analog voice waves on an oscilloscope
- invite speaker from the local phone company to talk about analog and digital phone lines, costs, capacity, and trends
- invite cellular technology provider to speak
- supply two video telephones; students divide into groups and call each other
- discuss various issues surrounding caller-id, ANI
- communications media - bring fiber optic cable, twisted pair, coaxial cable to class
- tour central office of local phone company
- invite speaker from the city government or power company to discuss fiber optic backbone around the city and how companies collaborated on the project; what will it do for the city?
- student goes to city officials in charge of 911 technology and brings back

information

- visit kiosks in places like hotel lobbies, Walmart automotive section, or museums; kiosk can print out maps and information; bring in printouts
- install modem card and software
- install sound card, speakers, software, screen saver
- cop cars with laptop; student brought cop and car to class
- PBX wiring closet on campus
- establish a help desk for a lab and let students run it for a week
- bring motherboard, hard drive, modem card, external modem, SIMMS chips, disks, tape, CD-ROM

Software activities

- demo installing software using 3.5" disks then CD-ROM noting time differences
- morphing - buy inexpensive package and let students change one object into another and explain underlying technology
- virtual reality and medicine
- medical speaker talks about sending x-rays over telephone lines to another location; what technology is involved?
- games such as hearts or chess--how do you play someone across campus?
- students scan photo of self into their resume

- *Internet* - provider such as Netscape
 - * research and construct a class home page
 - * demonstrate searches for information on the Internet
 - * download files, print files
 - * build list of <http://> sites -- xerox, distribute, add to
- integrate MS Excel, Access, Word, Powerpoint
- mail merge with special stationery
- e-mail activities: debate the code of ethics and privacy issues, also the first amendment as it relates to banning certain vocabulary and graphics on the *Internet* and e-mail

Other activities

- use lots of "real world" applications (Muehsam, Muehsam, & Sweeney, 1996)
- make a checklist for current hardware and software on market; students select their "ideal" home computer based on their needs and financial resources
- bar code scanning, especially as it relates to retail selling, price changes, inventory; investigate purchasing a software program to print bar codes and let students produce their own bar codes
- find out how much it would cost to purchase 25 pagers and give them to patrons of a restaurant when they are placed on the "wait" list for available

seating; how would you justify the cost of purchasing pagers?

- short tour to a restaurant such as Applebee's to see how wait staff use a touch screen to input orders into the computer and initiate printing out checks
- build film library: Bill Gates-Tycoon, Using the Internet, Phone Fraud, etc.
- have students use a word processor to answer discussion questions on tests
- give pop-quizzes on computer and have students take them on their own and send answers to me by e-mail
- set up *Internet* chat page and continue a class after class hours where all go on line and respond to additional questions

"Technology is always changing and higher education needs to change with it."

(Autodesk, 1995, p.15). To keep up with high-tech advances takes time, training, and financial resources. Colleges and universities constantly juggle their financial dollars to support faculty, build computer labs, buy hardware and software as best they can. We as faculty can begin by admitting that we don't know everything and view new advances as inevitable. We may be the victim of technology's planned obsolescence in some cases. However, in spite of changes, I try to keep an open mind, develop a healthy amount of curiosity, and ask for help when I can't figure out how something works.

"It is incumbent on all of us to share tools and ideas. Then perhaps we can achieve a curriculum of continuity and interactivity that makes for truly effective teaching

and learning experiences for our students" (Boettcher, 1995, p.12). Let's look toward the future and plan how technologies can support teaching and learning.

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TECHNOLOGY IN BUSINESS COMMUNICATION

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Abstract

While the content of a business communication course bulges with topics such as letter patterns and styles, short and long reports, ethics, intercultural communications, oral presentations, and collaborative writing, technology can be incorporated as a tool that helps to get the work started, formatted, revised, and enhanced.

Use the capabilities of the microcomputer to slowly build competencies and confidence. Start with the familiar of retrieving files, add the windows environment and mouse movement, add editing features such as spell checkers and grammar checkers, progress to wizards and charts, and then leap to e-mail and the internet.

TECHNOLOGY IN BUSINESS COMMUNICATION

Given: a one-semester Business Communication class meeting in a room equipped with networked microcomputers for each student. The teacher's station includes a Pentium stand alone microcomputer with a projection system. Question: Without sacrificing course content, can an instructor integrate technology throughout the entire semester?

In the 1995 NBEA yearbook, *Technology in the Classroom*, Susan Jaderstrom writes that "technology should be a part of every class." She indicates that helping students adapt to technology contributes to their "future mobility, advancement potential, compensation, and job satisfaction." As a means to accomplish these goals for students, she suggests "integration of word processing, electronic mail, and desktop presentation software in business communication classes."

As early as the fall of 1993, the author moved her sections of Business Communication into a microcomputer laboratory setting. During 1993-1994, the students used stand alone pc's with WordPerfect 5.1, RightWriter, and Lotus 2.2 software. During 1994-1995, the students used stand alones with WordPerfect 6.0 for Windows and Lotus for Windows. During 1995-1996, the students are using networked pc's, Microsoft Word 6.0, WordPerfect 6.0 for Windows, Excel, PowerPoint, Eudora mail, and the Internet. Other technology such as distance learning, group support software, and video conferencing, however, are not addressed in this paper.

Start with the familiar

Although the computer literacy background of the students varies, most students come to the class with knowledge of DOS based word processing (WordPerfect 5.1) and spreadsheet software, or they are concurrently enrolled in such a course. On the first day of class, I distribute a "teaching disk" to each student. The computers are started and WordPerfect 5.1 is loaded. (Our lab is "rigged" or set up to default to Drive A. Therefore, most software will not load unless a disk is in Drive A.) The importance of logging on to Drive A is discussed, and the course syllabus is retrieved from the teaching disk. Each student prints a take-home copy.

On the second day of class, students retrieve the WordPerfect 5.1 version of the chapter outline saved on the teaching disk. They are encouraged to take notes as I use presentation software to fill in and enhance the contents of the lesson. The elements of the Windows environment are also introduced near the end of the class session.

On the third day of class, students bring disks to format. Then they load Windows 3.11 and Microsoft Word. This time, they practice retrieving files from the fileserver, moving around in the files, changing the font sizes, and saving these files to their new

disks. The topic for the day is external communication. The practice files are sample crisis letters or good will messages released by well-known firms.

Introduce editing features

Lesikar, Pettit, and Flatley (1993) cite a study indicating that "75 percent of the spelling errors in student letters could have been caught by spelling checkers." To illustrate the value of spell checking, my students edit a file created by a scanner. This file of lecture notes supplied by the publisher are scanned, saved to a disk, and then transferred to the fileserver. As expected, unusual spellings occur as illustrated by Appendix A.

As the students use files such as Appendix A, several skills are integrated early in the course: loading software, retrieving files from the fileserver, scrolling around in the file, changing font sizes, note taking, spell checking, and saving files to student disks. A benefit to the teacher and department occurs during test taking. Students have "no fear" of retrieving a test file from the teaching disk, scrolling around in the file, and changing font size as they mark their answers on scan sheets. The first page of a quiz over Chapters 1 and 2 (Appendix B), was typed using the outline feature.

Introduce additional editing features

While students are easily convinced of the obvious advantage of spell checking, they are often unaware of the value of grammar checkers and thesaurus. The benefits of grammar checkers as listed by Lesikar, Pettit, and Flatley (1993) include (a) checking grammar, style, word usage, and punctuation problems; (b) reporting readability, strength, descriptive, and jargon indexes; and (c) identifying slang, jargon, misspelled, misused, or difficult words for readers to understand. The authors further indicate that a thesaurus is a powerful tool and is more likely to be used in an electronic form than in book form.

A variety of other editing features can be just a few mouse clicks away. Students enjoy trying out these helpful features:

1. Bulleted items or enumerated items easily contribute to the clarity of messages as illustrated by Appendix C.
2. The tables feature is helpful in preparing orders, a direct request letter pattern. Sorting items arrayed as a table is as simple as selecting the table, clicking the words *table* and *sort*, selecting a column, and indicating *ascending* or *descending*.
3. The automatic insertion of dates and special characters such as trademark symbols and phonetic markings (Señora) are also easily illustrated.
4. The outline feature facilitates the transition to PowerPoint.

Integrate editing and e-mail

Since spell check features are not available in Eudora mail, I teach students to prepare and save their messages in the Windows environment. Edited Word or WordPerfect documents are then copied to the clipboard and the software is closed. Students then load Eudora, fill in the heading information, and "paste" the text of the e-mail into position. Instructions for integrating Windows software and Eudora are shown in Appendix D.

Introduce templates/wizards

Students often lose points on their early writing assignments because of errors in formatting of correspondence. A memo template or wizard gets students off to faster starts. Later in the semester, students use letter wizards. However, I no longer recommend resume wizards. These wizards are filled with desktop publishing gimmickry that is appropriate for the eyes of human resource personnel. The growing trend, however, is electronic submission or scanning of resumes and cover letters. Desktop publishing pizzazz as well as simple folds in the paper can be easily misinterpreted and translated into gibberish.

Share assessment plans

The revision step in the writing process requires emphasis. My students bring in a writing assignment saved on their disks. They retrieve the assignment, execute spell check and grammar check, and then show a draft to two classmates for comments. In addition, they retrieve my accompanying assessment checklist (see Appendix E), fill it in, and staple it to the front of their messages. Critical thinking skills of evaluating, decision making, problem solving, and teamwork are also strengthened.

Extend job searches

Allow students to read about companies and job opportunities over the internet. Netscape sites provide information about CEO's, corporate cultures, career fairs, and job openings. One typical site listed by the *PBL Business Leader* (Spring 1996) is <http://www.cob.ohio-state.edu/dept/fin/osujobs.htm>.

Introduce charts

The tables feature used in the direct request unit facilitates introduction to charts during the report writing unit. Students enter research results into a table. Making a chart is easily illustrated. Student select the appropriate cells, click the chart icon, and make adjustments in titles and legends.

Introduce PowerPoint

The use of PowerPoint integrates the students' knowledge of chart making and outlines. During the unit on oral communication, students can be shown how to change speech outlines to slides and how to bring in charts created during the report writing chapters.

Use search engines

Mary Ellen Guffey (1994) reports that no longer do college students need to rely "almost totally on the research resources ... physically available on their campuses to enhance their study. Today, the Internet extends any student's learning resources to educational, business, and governmental organizations around the globe." She suggests several sites including the use of these powerful Web search engines: InfoSeek--<http://www.infoseek.com/> or Excite NetSearch--<http://www.excite.com/>.

Summary

While the content of a business communication course bulges with topics such as letter patterns and styles, short and long report, ethics, intercultural communications, oral presentations, and collaborative writing, technology can be incorporated as a tool that helps to get the work started, formatted, revised, and enhanced. Use the capabilities of the microcomputer to slowly build competencies and confidence.

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Appendix A LECTURE NOTES

(a scanned page from Instructor's Resource Manual To Accompany Business Communication Today, 4th Ed., McGraw-Hill)

Editing Your Message

Three steps in the editing process:

1. Evaluate content and organization
2. Evaluate style and readability
3. Assess word choice

When editing for content and organization, check the

Order of points

Mix of general and specific

Balance among points

Emphasis

Quality and quantity of evidence

Irrelevant information

Quality of introduction and conclusion

When editing for style and readability, check the

Tone

Interest level

Clarity and readability

Fog Index: readability formula based on sentence length and word length

Other aspects of readability:

Sentence structure

Order and flow of ideas

Paragraph construction

Transitions

Appendix B

AD252 Quiz, Chapters 1-2--Spring 1996

1. Horizontal communication structures
 - a) increase the number of levels in the organization
 - b) reduce the number of levels in the organization
 - c) reduce distortion
 - d) both b and c
2. The formal communication chain can have the following disadvantage:
 - a) increasing employee flexibility
 - b) summarizing the lines of authority
 - c) causing information overload
 - d) fragmenting information
3. A sales manager giving instructions to a salesperson is an example of
 - a) upward communication flow
 - b) downward communication flow
 - c) horizontal communication flow
 - d) informal communication flow
4. Formal methods for channeling information upward include
 - a) group meetings
 - b) interviews with employees who are leaving the company
 - c) formal procedures for resolving grievances
 - d) all of the above

Appendix C

December 3, 19xx

Ms. Barbara Lane, Project Manager
Rackley Engineering Consultants
23, rue de Penthièvre
75008 Paris
FRANCE

Dear Ms. Lane:

Would you please assist me as I begin plans to transfer to the Environmental Group in the Paris operation --my first overseas assignment? Because you have been working in this overseas location for several years, you may be able to give me some ideas on the following items:

- Can you suggest a strategy to help me optimize my purchase of francs, especially during the transition period?
- What degree of proficiency should I have in the French language? If I must speak French fluently, how can I manage until I learn the language?
- Can you suggest any books or other resources that will prepare my family and me for living abroad?

I will arrive on May 26 to begin work on June 2. Even though my transfer is six months away, my family and I wish to make our transition as smooth as possible. Consequently, receiving this information from you will help us achieve that goal.

Sincerely,

Don McClure
Staff Engineer

*From the Teacher's Resources Manual, *Basic Business Communication*, 5th ed.

Appendix D

INTEGRATING WINDOWS SOFTWARE AND EUDORA
MAIL

1. Load Windows and Word or WordPerfect.
2. Prepare your text, edit, and proofread.
3. Complete spell check and grammar check.
4. Revise and save.
5. Choose **edit** in the menu bar and **select all**.
6. Send a copy of the text to the **clipboard**.
7. Close the document and the word processing program while staying in the Windows environment.
8. Load Eudora.
9. Start a new message.
10. Fill in the header and tab to the message area.
11. Choose **edit** in the menu bar and **paste**.
12. Queue the document.
13. Send the queued document.

Appendix E

Direct Request Exam

Directions: During this 50-minute period using Word 6.0 or WordPerfect 6.0, write a letter to your favorite high school teacher or current employer. Ask him/her to serve as a reference for an academic scholarship. (You supply a name for the scholarship.)

Print a copy of the checklist below now so that you can refer to it as a guide in developing the letter. (Or use *Window* on the Menu Bar to toggle between your letter and the checklist as you work.) Check each item as you develop the letter. Spell check and grammar check your letter before printing. Staple the completed checklist to the front of your letter. The checklist will be used in the evaluation process.

Description	Yes	No
My dateline is 2.0 inches from the top edge of the paper.		
I provided a complete inside address.		
I used an appropriate salutation.		
I used direct style by stating a direct request in the first sentence.		
I provided the name of the scholarship.		
I asked the reader to "target" the criteria specified by the scholarship: scholastic potential, leadership potential, potential for success in the major, and need (optional).		
If I referred to a resume, I placed an enclosure notation at the bottom of the letter.		
I provided the name and address of the scholarship committee.		
I mentioned a date that the reference letter should be mailed.		
I achieved the "you" attitude.		
My sentences express confidence.		
My sentences are carefully edited to achieve clarity without wordiness.		
I did not mention additional correspondence such as "if you have any further questions....")		
I have written an appropriate closing paragraph.		
I used a complimentary closing with appropriate punctuation.		
I used spell check and grammar check.		
I typed my name and signed my letter.		

**This exam, with its instructions and checklist, is placed on the fileserver. The teacher begins the exam session by writing the name of the file on the chalkboard. The students retrieve from Drive H and proceed using the software they prefer.*



Track Sessions



Track 1: Technology and Pedagogy Education / Liberal Arts



Mid-South Instructional Technology Conference



**Beginnings:
Introducing Computer Technology to Students in
Speech-language Pathology and Audiology**

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ABSTRACT

In this multimedia presentation, a speech-language pathologist and an audiologist discussed ways of introducing students to technology such as e-mail, World Wide Web searches, computerized speech analyses, listservs, and multimedia equipment. A preliminary survey was devised to given to undergraduate and graduate students in the department of communication disorders; its purpose was to explore students' knowledge of and attitudes to technology prior to the introduction of technology in coursework. Results of this survey and of student outcomes after completion of tasks were discussed.

Presentation April 1, 1996

Overview of Department:

The department of Communication Disorders at Southeast Missouri State University is in the College of Health and Human Services, and offers an undergraduate and a graduate program in speech-language pathology. The graduate program is accredited by the American Association of Speech-Language Pathology and Audiology (ASHA). The department currently has seven full-time and four part-time/adjunct faculty. The student body comprises approximately 70 undergraduate majors and 40 graduate majors. On-campus facilities include a Speech-Language Clinic with a video observation system, an Audiology Clinic with Computerized Audiometric Instrumentation, and a student work area with 4-5 computers (IBM and Apple). While all faculty offices have personal computers, only the departmental main office and two of the faculty offices have modem connection to the university mainframe; networking for all faculty offices is expected to be completed by next semester. Although currently, lab space is very limited, the department does have an extensive array of speech science instrumentation, all PC based. Students have access to a variety of computer labs across campus. In addition, faculty in our college may utilize two computer instructional labs equipped with computer projection systems and Internet access.

In Spring 1995 all but one faculty member had #386 computers, and one had a #486 computer; no CD-ROMS were available and there was no mainframe access. Now, all faculty have at least a #486 computer (3 have Pentiums); one faculty member has a Power Mac; two have CD-ROM capabilities; and three have Internet access. In Spring 1995 although all faculty used word processing programs none used the Internet, E-mail, or CD-ROM technology. Five instructional/clinical computer software programs were utilized and one faculty member used computerized speech science instrumentation. Now, a year later, six of the seven faculty members use E-mail and the Internet on a regular basis (including one who has a home page under construction); one faculty member has developed a Phonics Instructional CD-ROM; two faculty have begun utilizing computerized presentations in classrooms; more than forty instructional and clinical software programs are now available and used in the department; and all faculty members are routinely using computerized speech science instrumentation.

Competencies for Speech-Language Pathologists and Audiologists

Cochran and Bull (1992) outlined competencies for speech-language pathologists that included familiarity with the computer as a diagnostic tool, as a generator of materials, a data recorder and analyzer, a means of access to resources, and as a forum for professional exchange. For audiologists, they discussed in addition the use of computers in hearing aid selection and management, cochlear implant configuration, and aural rehabilitation. In the areas of audiology and speech science, computer technology has moved to the forefront in both the clinical and laboratory

settings. It is imperative, then, that students in both speech-language pathology and audiology acquire fundamental skills with all aspects of computer technology in order to maintain professional marketability. In both the speech-pathology and the audiology classrooms and clinical laboratories, there are numerous potential avenues to utilize computer technology in an instructional manner. Most notably there has been, in the past two years particularly, a proliferation of internet sites providing excellent resources (both text and graphic) for students to utilize in a self-instructional manner or for the instructors to incorporate in class presentations. A few of the many examples in speech-language pathology are sites dealing with communication disorders specific to certain disorders such as Multiple Sclerosis, Parkinson's Disease, Stuttering, Traumatic Brain Injury, and Down Syndrome. Audiology sites include Sullivan's (1995) Audiology Forum: Video Otoscopy web site and Cheap's (1994) Misc.kids Frequently Asked Questions - Ear Infections and Ear Tubes Web site. In most cases, the sites in both disciplines are well-documented and include appropriate copyrights and disclaimers. Also, most sites are easily accessible via most internet search tools. There is also the potential to provide textbook quality materials via the Web (currently referred to as internet publishing) or to utilize a Web home page for the delivery of course handouts, quizzes, and other communications. Study sessions may also be incorporated via newsgroup postings or even on-line "chat" communication. Audiology classes provide another potential opportunity to integrate computer instruction with the academic curriculum. The proliferation of computer-based audiologic instrumentation and application makes it imperative for the audiology student to develop basic computer knowledge.

In Audiology, the following competencies were proposed initially: the ability to utilize PC-based audiometers for evaluation of hearing; the ability to utilize word processing capabilities for file management and report generating purposes; the ability to utilize electronic mail (E-mail) for professional correspondence; the ability to access the internet and conduct information searches utilizing the World Wide Web, Listservs, Gophers, and Newsgroup sites; and the ability to utilize audiological instructional programs (e.g., computerized audiometric simulations). Additional competencies suggested for more advance students included: the ability to utilize "NOAH-based" office management software and programmable hearing aid applications; and the ability to create computer graphic presentations and aural rehabilitative information files for use in rehabilitative intervention.

In recent years, computer technology has revolutionized the analysis of speech production and speech perception in both research and diagnostic settings. Complete laboratory systems (e.g., the Kay Elemetrics Computerized Speech Laboratory) which allow the transformation and manipulation of numerous parameters of digitized speech samples are now available on large memory personal computers. In most cases, only minimal knowledge of the Windows operating environment and basic typing skills are needed to perform quite complex speech analyses.

In the speech science laboratory, students may be introduced to technology through hand-on speech analysis. Spectrographic analysis, now readily accessible through the personal computer, is an ideal way to supplement the theoretical study of speech production as well as to augment the study of phonetics. Students may be required to conduct analyses of assigned speech samples which demonstrate fundamental differences in place of manner of articulation as well as the influence of phonetic context and prosodic elements on the acoustic speech signal. It may also be useful to require students to review samples of the abundant literature available in the area of spectrographic analysis. Students may also be encouraged to conduct their own replicative or pilot analyses utilizing the spectrographic analysis capabilities of the person technology, has opened a new arena of therapeutic options for the speech-language pathologist. Special application programs, such as the Kay Elemetrics Sonamatch option, also provide unique rehabilitative visual display which evolved from earlier spectrographic features of speech. Students may be encouraged to apply spectrographic analyses in the clinic environment with their own clients.

A related area of speech analysis which has also been recently enhanced through computer technology is voice analysis (e.g., the Kay Elemetrics Nasometer Analysis Program, the Kay Elemetrics Visipitch, the Kay Elemetrics Nasometer, and the Kay elemetrics Aerophone II). Computer-based programs are available to measure nearly every aspect of voice production from the respiratory system, to laryngeal vibration, to articulatory structural movements. No longer should the speech-language pathologist rely solely on a trained ear to subjectively document pathological or normalizing changes in voice production. Students should be aware of the considerable controversy regarding which measures are most appropriate for voice behavior documentation; however, the personal computer allows multiple measures to be taken or calculated simultaneously thereby allowing flexibility in the clinical arena as well as providing an excellent way to compare methods of voice analysis in the investigative arena. Fortunately, all of the voice analysis systems on the market today are generally menu-driven and user-friendly. With minimal introduction to basic computer techniques, students may shift their focus from program operation to program application very quickly.

Perhaps nowhere in the field of Communication Disorders is there a greater discrepancy between students' knowledge of, use of, and attitudes toward computers and the expected competencies than in the area of speech science. The competencies identified by Brown and Kester (1993) which are particularly appropriate for speech science students include: the ability to use MS-DOS commands and the MS-Windows interface; the ability to use a program with the documentation provided; and, the ability to manage files on hard disk. Additional advanced competencies include: the ability to create, sort, and query a database; and, the ability to create charts, graphs, and flow charts.

In recent years, instrumentation in the speech science laboratory has been

increasingly computerized. Originally, instrumentation was manufactured and marketed in bulky hardware units. Now instrumentation is, for the most part, software designed and incorporated into the personal computer. This has facilitated the integration of various instruments into one unit as well as increased student access to the instrumentation. While students express considerable apprehension about the instrumentation associated with speech science as well as computer use in general, the user-friendly design of most instruments makes orientation to the use and application of the instrumentation less time consuming.

Technology Goal

One of the goals developed for this academic year by the Information Technology Committee for the College of Health and Human Services at Southeast Missouri State University was to assess the training needs of all faculty and students and to provide opportunities for those needs to be met. An assessment instrument was developed by Julia Wommack, a graduate student in Communication Disorders, to gather information about current status of competency of students. We wanted an instrument that would assess students' attitudes towards computers, their training experience, the kinds of computers and programs with which they were familiar, and their familiarity with and use of e-mail and the Internet. After a pilot study this instrument was revised to its present form (see Appendix A) and distributed to 75 students in the department of communication disorders.

Survey

Results of this preliminary survey showed that of the 75 students who completed the questionnaire, only 9% were very confident about using computer technology, while more than 35% were either somewhat or very apprehensive about it. While 60% had used or were using word processors, only 36% owned a computer (most often an IBM). 63% of the students had taken a required computer course in college and had been introduced to the use of e-mail; however, only 14% used e-mail regularly. More than 59% had never used the Internet; none had used Powerpoint or any other technology program in class presentations.

The most commonly measured concept relating to college students and technology is that of attitude (Moon, 1994; O'Donnell, 1993). Not surprisingly, students with more computer experience expressed more positive attitudes towards technology. One of the most frequently cited reasons for infrequent use of computers is lack of training (Masterson, 1994). Wetzel (1993) discussed the fact that training can be provided either in core computer literacy courses or in an integrated model; we felt that the latter would be the more effective approach to improving student competency.

Where To Begin?

After viewing the results of the survey we listed basic competencies that we wanted to develop in our respective courses in speech-language pathology and audiology. These courses and the applications made in speech-language pathology and audiology classes will now be discussed. Many of these classes took place in the instructional labs on campus.

Applications in Speech-Language Pathology Course Work

The focus of the graduate class in Augmentative and Alternative Communication (AAC) is on individuals with severe communication disorders for whom gestural, speech and/or written communication is temporarily or permanently inadequate to meet all of their communication needs. These individuals need adaptive assistance of various kinds and with varying degrees of technological sophistication; consequently, this course lends itself to technological application and provided a very appropriate venue for additional training. The following tasks were included in the syllabus for this course and marks were assigned for task completion.

Assignments:

- Students must "sign on" and create a message in e-mail.
- Students must access and answer a quiz sent by e-mail, and send it back to the instructor. This ensures that students are able to create, save, and e-mail a document over the network.
- Students must access the Internet to find web sites appropriate for the course being studied. They then bring to class information they have downloaded from that web sites.
- Students must create a mailing list of class-members, and then use it to send information about their class presentations.
- Students must sign on to a list-serve and bring to class some printouts from it.
- Students are invited to prepare class presentations using Powerpoint or a similar program (this was not a compulsory assignment).

Applications in Speech Science and Audiology Course Work

Assignments

- Utilization of e-mail to receive class handouts and assignments.

- Subscription to an audiology-related listserv.
- Subscription to an electronic journal (e.g., Otology Online).
- Compilation of information obtained from an FAQ, Gopher, World Wide Web, and Newsgroup site.
- Utilization of online CHAT to conduct study sessions.
- Creation of aural rehabilitative materials utilizing on-line sources.

To reduce the apprehension of the speech science laboratory, facilitate development of the computer skills in those students who lacked such skills, and to provide students with active learning experiences of key concepts, group labs were conducted initially. Careful selection of groups to include a mix of experienced and non-experienced computer users facilitated these lab experiences. Laboratory groups were assigned an instrument for which they are to read the documentation; learn the process of sampling, analyses, and data storage associated with the instrument; and compose a set of "cookbook" procedures for operating the instrumentation. Following the group lab demonstrations students conducted investigations on their own utilizing the "cookbook" procedures.

Results

Results of this project have been very positive with respect to student learning. Members of the graduate class in speech-language pathology were asked to write anonymously about their assignments, indicating whether they had found them useful and whether their attitudes to technology had changed. Their comments were unanimously positive and indicated increased confidence in use of technology. These are typical examples: "As a result of these assignments I feel capable of using the Internet and e-mail". "I have gained a lot of information related directly to my major. "I used to view computers as not having much personal/professional use to me beyond word processing. How wrong I have been! I learned to use the computer in the context of my field". To date, five graduate students have volunteered to learn, and have successfully used, Powerpoint in class presentations and none had previously been exposed to it.

It was been observed that students who were unfamiliar with Windows-based applications, learned basic Windows functions rapidly by utilizing the speech science instrumentation. Students often reported that they did not know they were utilizing Windows but once they became familiar with the instrument in the group setting, they felt comfortable with other Windows application.

A particular problem encountered with this approach is that the instrumentation is subject to a variety of potential malfunctions. In this regard, when the instrumentation difficulties arise students are expected to follow a three-step process for resolving the problem including: a manufacturer consultation; a university technician consultation; and finally, an evaluation of the problem's effect on the assignment if the first two steps do not yield a solution. This facilitates independent problem-solving abilities in the students and prevents over-dependence on the instructor to solve instrumentation problems. Finally, technology (e.g., frequent software updates, instrument designs, additional application, etc.). Two possible solutions for the instructor in this regard are the creation of challenge groups composed of students who already possess considerable computer experience or utilization of graduate student assistance in the installation and initial set-up of new software or updates.

The greatest difficulty encountered in our experience with these assignments has been gaining adequate student access to computers. It is critical that academic institutions respond to the growing need for computer/internet access. This is particularly problematic in institutions serving rural populations. When incorporating computer assignments in the classrooms, a student should not be penalized for failure to access the computer, provided reasonable attempts have been made by the student. Instructors must facilitate equal opportunity to complete assignments and participate in study sessions, computer simulations, etc.

Finally, problems have been encountered with student documentation of information found on the internet as well as student evaluation of the information. This provides an excellent opportunity for instructors to emphasize and promote critical evaluation of information located via the internet and guidelines are available for citation and referencing of internet information. Also, it is imperative that instructors be somewhat flexible when students report difficulty with computer technology as a reason for late assignments. The instructor's intuition regarding patterns of late assignments as well as the student's attempts to complete assignments should allow an objective decision.

Future

As faculty become more proficient and as our access to technology expands we expect to continue to include technology training within the context of each domain. For example, courses in child language development and disorders might include examples of computerized language analysis and introduction of software used in intervention. We expect to see further and rapid expansion of computer technology in the fields of speech-language pathology and audiology look forward to continuing to explore and promote its use. We feel too that this first essay into the integration of technology with course-work has made us better teachers or rather, co-learners.

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APPENDIX A

COMPUTER INVENTORY

Name _____ Class _____

Department _____

Rate your feelings towards computers. _____

1. Very Confident 2. Fairly Confident 3. Neutral 4. Somewhat Apprehensive 5. Very Apprehensive

Please give a detailed explanation on your choice. _____

Have you had any training in computers? ☐ None ☐ Some ☐ A LotWas a computer course required by the school you attended? ☐ Yes ☐ No

When and where did you have this training? _____

Mark the type of training

☐ Word Processing☐ Database☐ Spreadsheet☐ Graphics☐ Presentation SoftwareWhat types of computers are you familiar with? ☐ IBM ☐ Macintosh ☐ Other

If other, what is the name brand of the computer? _____

Do you own a computer? ☐ Yes ☐ No

If yes, what kind? _____

If no, then where do you type your papers? _____

Do you own a word processor? ☐ Yes ☐ No

If yes, what kind? _____

If no, then where do you type your papers? _____

What types of software programs do you know how to use?

☐ Microsoft Word☐ Word Perfect☐ Windows☐ Lotus 123☐ Excel☐ dBase☐ Freelance Graphics☐ CD-ROM☐ Power Point☐ Others (Please List) _____

Have you used E-Mail ☐ Yes ☐ No

Where? _____ and to what extent? _____

Have you used the Internet? ☐ Yes ☐ No Where? _____ and to what extent?

Do you feel that there are enough computers available in your department for both faculty and students? ☐ Yes ☐ No

Comments _____

What other types of technology/software would you like to see your department purchase?

Do you feel computer knowledge is important for your career? _____

1. Very Important 2. Somewhat Important 3. Not Important

If you see technology as important, in what ways do you foresee it being used in your future professional life? _____

Please put your E-Mail address here: _____

Other Comments: _____

**Title: THE 21st CENTURY TEACHER WILL BE READY FOR THE 21st CENTURY
CLASSROOM: NOT!**

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While new and up-to-date equipment and software are introduced to the classroom, one of the components of the teaching-learning system --the teacher-- is not being updated. Current instructional technology training is not adequate to prepare the teacher of the 21st Century classroom. The existing gap between what little training teachers receive in instructional technology and what teachers in the classroom have to do to implement technology grows wider. Teacher training programs were asked: What courses in instructional technology are required for graduation? The answers vary from "none are required" to "introductory courses in computer literacy." Most of these courses are taught by departments outside of Education. A brief needs analysis of what a teacher who wants to implement technology must actually do to accomplish this goal reveal the following to be among the most intensive and important activities:

1. Grant writing and fund raising.
2. Budgeting, including maintenance, repair, and upgrade of hardware and software.
3. Design the use of the technology from hardware, software, facilities, and adapt it to meet his/her needs and that of his students.
4. Troubleshoot basic computer equipment, including the use of basic electronic tools.
5. Design, install, and maintain local area networks.
6. Evaluation and adaptation of software. Creation of courseware.
7. Classroom management techniques for hybrid classes: technology and non-technology

Two of the most needed assets are patience and time: patience to wait as long as it takes for a grant to be awarded, and time to learn all that needs to be learned and keep learning since in technology obsolescence is the rule. A good place to begin to address the issue would be to apply job and need analysis to the training in instructional technology and system analysis to the entire teacher training curriculum.

**InHealth's Student E-Conference:
"To 'Lurk' or To 'Chat'? That is the
Cyberspace Question?"**

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ABSTRACT

This paper presents the design, implementation and evaluation of an on-line student facilitated health care communication e-conference, as part of a course requirement of a health care communication course taught at Indiana University-Purdue University at Indianapolis, in Spring 1995. First, we explore the use of Internet components in teaching an educational course and then explain how this particular on-line e-conference project was developed. Second, we outline the mechanics of operating a student run e-conference. Lastly, we report on the educational utility of computer assisted learning and then suggest future techniques for developing this project further.

The electronic conference as a medium to educate students through debate about the integration of on-line technologies and health care communication issues was successful as a learning tool. The students learned to apply theories, principles and concepts from the classroom by interconnecting with health care communication practitioners and scholars in an e-conference which acted as a Cyberspace problem-solving workshop. This telecomputing workshop assisted students in learning about group processes, health care communication theory and the useful interdependence of these two activities on-line.

I

"Health communication is an area of study concerned with human interaction in health care process. It is the way we seek, process and share health information. Human communication is the singularly most important tool health professionals have in providing health care to their clients... Health care professionals depend on their abilities to communicate effectively with their colleagues, clients, and often the families of their clients to perform their health care responsibilities competently... Active and accurate communication between interdependent health care professionals [and researchers], as well as between clients and practitioners, enables coordination within the health care system" (Kreps, & Thornton, 1992, p. 2 & 4).

Introduction

In order to effectively explore health communication, we suggest that students of this new discipline must examine the interdependence between health providers, health researchers, health consumers, and health care communication students. Toward that end, we developed a "Healthcare Communication," course several years ago to facilitate the experiential learning of emerging health care communication theory and place that theory into practice by studying the transactional nature of communication in health care contexts. The course is designed from an interdisciplinary perspective by integrating medical anthropology, medical sociology, medical history, health psychology, medical ethics and health communication theory and skill building techniques together in order to consider different communication levels occurring in a variety of health care contexts. Topics in this course range across communication levels (e.g., intrapersonal/cognitive, interpersonal, group, organizational, mass media/mass mediated and public communication levels) within a variety of health care environments. For example, one section of the course might examine interpersonal

1

communication patterns among hospital personnel who are in the process of developing communication strategies for a drug abuse campaign.

Topics covered in the course include:

1. Health care communication paradigms.
2. Societal perspectives on health care and the psycho- social construction of illness model.
3. The nature of interpersonal dyads within health care contexts .
4. The process of organizational communication in a health care setting
5. Small group interactions in health care teams and support groups.
6. Message strategies used in health promotion campaigns.
7. The influences and constraints of culture in health care.

Students enrolled in the course are generally from nursing, pre-medicine, pharmacy, hospital administration, physical therapy, psychology, pre-dentistry, health care communication and other allied health fields. Throughout the semester the goals and behavioral objectives of the entire course are evaluated by using a variety of assignments including, a critical think piece, midterm examination, a set of annotated bibliographies on a specific health care communication topic, a substantive literature review, and a final examination. Finally, the class facilitates an on-line electronic mail conference in order to demonstrate collaborative health care problem solving processes on-line. The e-mail conference (e-conference) allows students to apply course related health care communication theory and skill building to InHealth, an interactive tele-computing Listserv.

This paper will present the design, implementation and evaluation of the on-line components of the health care communication course as it was taught at Indiana University-Purdue University at Indianapolis, in Spring 1995. First, we will explore the

use of Internet components in teaching an educational course and then explain how this particular on-line e-conference project was developed. Second, we will outline the mechanics of operating a student run e-conference. Lastly, we will report on the educational utility of computer assisted learning and then suggest future techniques for developing this project further.

Project Design

Internet Components in Educational Course work

Calcari & Quaterman (1994) suggest that by the middle of 1994, there were roughly 20-30 million people in 146 countries who could exchange electronic mail with each other. There are a variety of integrated components which make up the Internet. According to Quible & Ray, (1995) there are three general components comprised of: tools, communications, and services. They suggest that tools consist of Telnetting, FTP, and E-mail; communications consists of Usenet groups and Listserv lists; and services consist of Gophers, Veronica, and the World Wide Web (Quible & Ray, 1995). The Telnet tool is used to connect to remote computer facilities in order to generally access public services such libraries and databases. FTP (File Transfer Protocol) allows individuals to copy a file from one Internet host to another. The Usenet groups enable people to communicate with one another worldwide on virtually any topic. Quible & Ray (1995) suggest that "approximately 12,000 discussion groups currently exist... [and] on the average day, approximately 40,000 articles are posted to these different newsgroups" (p. 12). While most newsgroups are not moderated, however,

sometimes volunteers monitor in-coming messages. Listserv lists are comparable communications components to Usenet groups. Messages are often shared throughout the listserv membership through conventional e-mail accounts. Although, some have on-line editors, they are also often unmoderated. Listservs also may maintain indexes and archives of earlier messages and other topic related resources (e.g., grant resource information or syllabi). Gophers are an easy to use service which provides access to an extensive amount of data and information and acts as a gateway to several other Internet components and subcomponents such as FTP. They primarily act as a browsing tool. Veronicas are merely search mechanisms within Gopherspace. Finally, the World Wide Web (WWW) is a "hypertext systems which provides links between various pieces of related information which can be in the form of text, sound or pictures" (Quible & Ray, 1995, p. 13). In order to reach a particular site on the web individuals log on to a World Wide Web address, called a Universal Resource Locator (URL's). Presently, on the Web there are numerous search engines which allow users the ability to search and find resources on the net. The most commonly listed ones are:

- Yahoo
- Web Crawler
- Lycos
- El Net
- All-in-1-Search

The Internet is a powerful collection of informational resources which are available to people through interconnected computer networks around the globe (Matyska, R. (1995). It allows numerous users to communicate valuable materials,

conduct research, interact with people with similar interests and access a wealth of data, despite significant geographical separations (Peck, Roxas, Peek, 1995). Harris (Matyska, 1995) suggests further three general functions of the Internet:

- * Interpersonal Exchanges - The Internet allows us to make interpersonal connections by communicating with people, talking with groups, groups communicating with groups, global classroom exchanges and electronic mentoring.
- * Informational Collections - The Internet provides for an exchange of data, tele-field trips and electronic publishing.
- * Collaborative Problem-Solving - The Internet can be used for informational searches, social movement projects and simulations (Matyska, 1995; Harris, 1995).

Quible and Ray (1995) suggest that students can specifically use the Internet then to "gather information when writing reports, to communicate with their instructor, to collaborate on writing projects at another college, and to look for employment opportunities (p. 11).

In designing our health care communication course, we focused on collaborative learning processes and basic Internet resource retrieval skills necessary to accomplish the stated goals for the course. The primary goal of collaborative learning was developed in order to open up discussion beyond our single classroom and to foster a larger amount of voices in encouraging problem-solving and audience awareness (Lopez & Nagelhout, 1995). Having students share information with other scholars and researchers in their field of study expanded their understanding of conceptual material

they were learning.

Designing An E-Conference

Before students could facilitated an electronic mail conference, several activities needed to take place. First, Schrader and Assante decided to use an existing hotline named InHealth as the forum for the conference. InHealth (Inhealth@cios.llc.rpi.edu) is a co-moderated/edited hotline on Comserve's Listserv list. Comserve is a large academic Communication Listserv (Comserve@cios.llc.rpi.edu) which houses numerous hotlines ranging on topics which include, for example, family, interpersonal and gender communication. Comserve is also linked via a Gopher and recently to a WWW home page. It is an internet resource which is partially opened to the public. A student may join one or two of the hotlines free of charge and also receive Comserve news. Comserve's parent organization, CIOS, has expanded Comserve's operations in the past few years. These operations include job position listings and sophisticated database materials and search capabilities, among others. Hotline moderators are responsible for their own services.

As does every hotline on Comserve, InHealth has the ability to provide previous message transcripts and it also is in the process of providing health communication syllabi, a small health communication bibliography list, and a resources list for grants and other internet links. Meanwhile, InHealth's primary function is to provide a forum for the exchange of ideas and information between an international audience of health care communication scholars, practitioners and students. In order to help further the hotline's mission and the course's collaborative decision making goal of expanding

students' classroom experience into integrated technologies, we developed an experimental on-line conference format.

Taking Care of E-mail Administration.

First, the instructors needed to educate students about electronic mail. Most of the students involved in this project lacked adequate electronic mail and Internet knowledge to immediately begin moderating a hotline conference. Therefore, a series of steps were necessary in order to complement their learning of health care communication subject matter with basic tele-computing systems.

- * Each student needed to get an electronic mail account on the University e-mail system and the professor established a distribution list in order to communicate to the entire class electronically.
- * Computer labs were also scheduled for various dates throughout the semester in order to introduce e-mail and Internet operations.
- * Students then needed to learn the basics of how the Internet functions and the terminology necessary in order to both operate and understand the virtual world they were soon to enter.
- * Students, began receiving useful computer documentation from academic computing specialists in order to successfully learn the operation of e-mail and the on-line editing system (PINE).
- * Lastly, additional handouts were provided by the instructor explaining specific e-mail commands and functions that the class would need in order to manage the hotline.

Establishing Objectives.

The next step as Mascolini (1995) suggests is to establish project objectives.

The e-conference objectives included the following:

1. Develop the promotional and public relations necessary to generate interest in the conference.
2. Conduct a thorough literature review of one of four health communication topic areas (health care policy and communication, drug abuse, mental health and AIDS education).
3. Develop a series of questions which emerge from analysis of the literature review they conducted.
4. Construct a single-page, well-argued response to the questions they intended to post as during their section of the conference.
5. Moderate and sustain a month-long electronic conference which covered the four health care communication topics.
6. Conducting a self-analysis of their group's participation in the project and answer questions to assess the effectiveness of the e-conference from the on-line membership.

Conference Operations

In order to foster a collaborative educational process, students formed four groups by their common interest in health care policy, drug abuse, mental health and AIDS education issues. Each group consisted of 4-7 members with two elected co-

chairs. The class then received a series of handouts which provided for a schedule of activities necessary for completion of the project, student group procedures, and the overall conference format. After forming groups the members of each group needed to create an electronic group distribution list to communicate with each of their group members and select their co-chairs. The responsibilities of the co-chairs included not only managing internal group dynamics, it also required them to attend bi-weekly co-chair meetings with other co-chairs. All of the co-chairs were responsible for meeting with each other in order to help develop a cohesive classroom strategy for facilitating the conference.

Every group was then responsible for joining several other hotlines which were topic related to their own health topic so as to call on-line resources for information during the conference dialogue when necessary. Next came time to develop promotional materials for the conference. Each group developed a conference title, logo, flyer and promotional release materials in order to be distributed to the hotline membership and other interested health allied professionals. After consensus was developed by the entire class on a collaborative title, logo, flyer, and promotional materials, a letter was drafted by the group to all InHealth members, flyers were printed and a public relations release document was constructed. All of these materials were mailed out to potential conference members and the University public relations liaison officer in order to generate school, local and national press. After promotional materials, were developed each group created a list of 12 questions and a one page response to each question regarding their topic area. They next needed to search out

several experts in their topic area that they could call upon during the conference for group clarification of an issue or for immediate input into the on-line discourse. A rotation schedule of who would monitor the hotline on which days of the week was also needed. The class was now almost ready to begin their conference. Numerous electronic postings accompanied the regular mailings of all of the promotional materials for weeks prior, and the hotline membership was beginning to show enthusiasm for an active on-line problem-solving session (See Appendix A, for Schedule for InHealth Conference).

Next came the very difficult task of developing a procedure for explaining to students how to foster dialogue among members of an electronic community. First, it was decided that the conference would open with a explanation of rules and procedures for all participants. At the beginning of each week the rules were re-submitted to the hotline membership in order to perpetuate group discourse and civility. Secondly, the students received a document labeled "Student Group Procedures" which outlined procedures for how to encourage group talk (See Appendix B). It was suggested that at the beginning of each week the best question out of 12 would be posted and that 24 hours be given for a hotline wide response. If the group determined there was sufficient dialogue then they were supposed to only observe the interaction. If, however, within a one day period no postings occurred then the student responsible for that day was to post the response to the appropriate question listed. If that action generated appropriate discourse, then no further action was taken. If within another 24 hour period no postings were made then another question was posted and the above

procedure was followed throughout the course of the week. If after 2 or 3 days the aforementioned procedures were not generating sufficient talk then the groups could invite one of their experts to respond to one the posted questions. The groups could also announce a scheduled posting by a noted expert in a particular field in order to generate more interest. Another technique suggested to foster discourse was the announcement of 3 or 4 scheduled experts having an on-line debate about a particular question. Groups were also to be ready to post bibliographies to assist InHealth members with any resource related questions that may emerge.

Evaluation

Assessment of the E-Conference.

The conference process included countless hours of preparation by both the instructor and the students. Before one posting occurred the students needed to develop promotional materials, carefully research their topic areas and learn a lot about electronic mail and the Internet. Overall, we believe that the conference was a productive learning experience for the students in how to incorporate theoretical health related subject matter with integrated telecomputing problem solving. Students learned how health practitioners and scholars construct solutions to difficult contextual problems. Students were able to understand how an on-line community dialogue emerges and how solutions generated could easily emerge into academic research papers, clinical studies, and policy development. Students were given an opportunity to have a direct interaction with scholars and writers whom they usually only know from textbooks, articles and film. This conference afforded them the chance

to examine their educational experience in real-time. Usually students read about a theory or concept and hope to apply it when they emerge with their degree and obtain a position in their field. However, this project allowed students to understand how theories, principles and abstract ideas can lead to collaborative generation of research questions and policy suggestions.

Limitations.

An endeavor this large is not, however, without its pitfalls. Exposing students to an intensive dose of integrated technologies and a survey of subject matter at the same time is very difficult. This project took many more hours than originally planned and several important realities emerged.

First, the notion of e-mail as a conversational yet formal presentation of ideas, was a difficult lesson. Although, E-mail has probably afforded many the opportunity to write more people than they had in the past, it also provides presentational challenges. As Bruhn (1995) suggests E-mail does invite the writer to write rapidly as though the speaker was thinking out loud (Bruhn, 1995). Students, however, need guidelines to help them to effectively design e-mail messages and to follow proper cultural norms for e-mail etiquette. Nantz and Drexel (1995) suggest several important guidelines for e-mail etiquette that would have been appropriate considerations for our health communication students to examine and employ. They suggest that e-mail writers should:

- (1) be considerate and not have too much information in one message and keep it to one or two screens,

- (2) consider the layout of the message and not write with all uppercase letters nor use long paragraphs.
- (3) keep discussion focused and if a new topic is developed, keep it under a new subject heading,
- (4) label subject line clearly and uniquely in order to make it easy to file, catalogue, cross-reference and retrieve,
- (5) don't send junk mail and/or chain letters,
- (6) don't forward too many copies of the same document to the distribution list,
- (7) send copies of messages to all those interested and affected by your suggestions and information,
- (8) don't expect an instant response to your mail and if you don't get a quick enough reply, then use other mediums for your message (e.g., phone).
- (9) assume that all messages sent over e-mail are open to the public at large and are permanent,
- (10) cite all of your information clearly and correctly, when paraphrasing and pay attention to any copyrighted material,
- (11) mark text that is not your own,
- (12) don't forward anything confidential to anyone without asking permission,
- (13) remember that you may be sending e-mail to readers with varying level of expertise and that you may need to explain certain terminology,
- (14) refrain from adding too many attachments to your mail,
- (15) avoid trivial responses, because it is not necessary to respond to everything,

- (16) don't rush writing your messages and use your text editors and spell checkers while organizing your thoughts (Nantz & Drexel, 1995).

We suggest that in the future more emphasis needs to be placed on e-mail etiquette with students facilitating an e-conference.

Another difficulty that came about was our students to desire to "lurk" (i.e., reading messages and not responding) rather than to "chat" (i.e., conversing on-line). Many students probably felt uncomfortable using the new technologies and responding to people they hold in high esteem, such as scholastic authors. In the future we probably need to spend more time developing exercises which alleviate on-line posting stress by increasing student familiarity with Listserv rules of conduct and net protocol.

Regardless of technological usage, collaborative group work is a difficulty which almost always arises within group process (e.g., getting all members to share equally). However, the added dimension of using e-mail rather than face-to-face communication and the delay of not working in real time when posting questions, frustrated some students. Although the Listserv hotline is intended to encourage interpersonal or group talk the impersonalness of some of the interactions caused by not being able to put a face to a thought or idea made some students uncomfortable. Other students were slightly apprehensive about communicating with experts in the field of health communication due to the sterile and very jargon laden responses to some of their questions. They felt as though they were not adequately prepared to engage in the discussion. Sometimes on-line membership almost totally discounted the student involvement and focused instead on responding to on-line members with self reported

equal or greater status (e.g., another professor or doctor). In the future, a greater effort needs to occur in including the students in the dialogue by having the course instructors moderate between the on-line community and the students. This could be accomplished by more closely monitoring daily postings, further developing questions which seem relevant to the answers posted by the students, and by demonstrating to students in a computer lab on an LCD Datashow how to generate further debate on-line.

Lastly, all classroom group work requires unique methods for individual evaluation. Several students showed concern over how they were going to be individually assessed on this project. Therefore, several class assignments that were distributed as a group assignment, were also first given to individual group members to complete. Students were responsible for a series of assignments which were graded individually in addition to the collaborative group work. We would suggest that the timing of this procedure is critical in fostering group cohesiveness and that delivering comments and critiques back to individuals in a timely fashion is also very important.

Future Suggestions.

We have several suggestions for the development of a future on-line student facilitated e-conference. First, we suggest that the subject matter be more narrowly defined to focus students studies and the e-conference in a very specific direction. Secondly, we suggest utilizing numerous exercises and simulations which teach the fundamentals of the tools, communications, and services of the Internet and the basic mechanics of e-mail commands and etiquette. Thirdly, we recommend that the most

difficult task for this project, is in trying to evaluate the pedagogical utility of using an e-conference to accomplish the course's goals. Trying to assess how much and how clearly the students learned about the process requires evaluative input from individual class members, the group as a whole and on-line conference membership feedback. Individual group members should provide a critical self-analysis of the learning process as it relates to the stated subject matter. The group should deliver an analytical summative report about the group's involvement in the e-conference as it relates to the concepts and principles used in the course. Finally, the instructor and the students should try to apply some methodological rigor toward understanding the effectiveness of running an e-conference regarding the given subject matter over the course of one, two, three or four weeks. In the health care communication course steps one and two were accomplished successfully. Students and groups both reported extensively about their experiential learning experience. However, step three, involving evaluation of the on-line community, proved unsuccessful. We believe that the length of the conference and the breadth of subjects addressed might have contributed to a lack of adequate responses. A series of questions should be electronically distributed at the end of the conference to all on-line conference participants in order to effectively evaluate the process. Robinson (1996) suggests that the asking the following questions may be helpful in discovering e-conference effectiveness:

1. "Does the information from the conference have value to me? [and why?]
2. Do I have the time to assess and manage all the mail I receive from the conference (or to read through all the postings in the newsgroup)?

3. Is most of the discussion on topic? [yes/no & why]
4. Is the information I receive usually accurate? Do the participants seem knowledgeable about the topic? [yes/no & why?]" (Robinson, 1996, p.29).

Conclusion

Using an electronic conference as a medium to educate students through debate about the integration of on-line technologies and health care communication issues was successful as a learning tool. The students learned to apply theories, principles and concepts from the classroom by interconnecting with health care communication practitioners and scholars in an e-conference which acted as a cyberspace problem-solving workshop. This telecomputing workshop assisted students in learning about group processes, health care communication theory and the useful interdependence of these two activities on-line.

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APPENDIX A

Schedule: For Inhealth Conference

Each Group Member Needs To Complete the Following:

1. Join Comserve
2. Join InHealth
3. Practice posting at least 2 messages to any health related hotline and get a response. Turn in a print out to your instructor and explain in a single typed paragraph any difficulties and how they were overcome. Also explain why you posted to a particular listserv list and what you learned from your experience.

Each Group Needs To Complete The Following:

The Co-Chairs are responsible for turning in the following information from the group:

<u>Assignment</u>	<u>Dates</u>
1. Select your groups and topics. Distribute addresses and phone numbers to each member of the group. Set up meeting times.	Week 1
2. A group Co-Chair emerges. Distribute addresses and phone numbers to each member of the group.	Week 2
3. Develop a group E-mail distribution list.	Week 3
4. Develop a <u>one page document</u> explaining the thesis and main points of what the group hopes to explore during their section of the conference. Please also develop a brief advertisement for the entire conference (including: a conference title, a logo, a brief attention getting flyer, and a paragraph press release statement).	Week 4
5. The group (as a whole) must join at least three topic health related hotlines relevant to their topic area and submit one posting to the instructor.	Week 5
6. Create a list of at least 12 questions to ask about your topic area. Develop a one page (typed) response to each question . Each answer should have several (5 or more) citations within the response.	Week 6
7. Create a list of at least 2-3 experts you can contact on e-mail to help you answer the above 12 questions. Contact them and ask them for the response to one of your questions so that you may post their response later in the semester.	Week 7

- | | | |
|-----|---|---|
| 8. | Construct a rotation schedule of who will monitor the hotline on which day. Develop a six schedule. The conference will start on a tuesday and run until the following tuesday. You will be responsible to monitor the hotline every day except for Sunday. | Week 8 |
| 9. | <u>The Conference</u> | Week 9
Week 10
Week 11
Week 12 |
| 10. | At the end of your week please draft a 2 page summary analysis of what your group learned, mistakes made, ways the conference could improve and suggestions for the future. | After Your
Week Is
Complete |

Note: Co-Chairs of the groups will need to schedule to meet with the instructor once a week from Week 5 through Week 12. Expect to meet for at least 1 hour each meeting. Also you will need to keep in close contact with your voice and e-mail.

Note: There are supplemental guidelines for the hotline procedures upcoming.

APPENDIX B

THE FIRST INHEALTH COMMUNICATION STUDENT-RUN ELECTRONIC CONFERENCE ("Student Group Procedures")

The conference will be sub-divided into four major topic areas. Each topic will be presented for discussion during a seven-day period beginning on March 21, 1995. The order of presentation will be: (1) Health Care Policy, (2) Drug Abuse, (3) Mental Health, and (4) AIDS Education.

- I. At the beginning of each week, a student group will post an initial discussion question.
 - A. Please post questions as early in the day as possible or the evening before.
 - B. If there is no response to the question within 12 hours from time of posting, then post your answer to the question.

- C. If there is a sufficient level of response to a question, then:
 - 1. Relax and wait until discussion flow decreases.
 - 2. Sufficient flow maybe defined as more than three responses within a 12 hour period.
 - 3. Insufficient flow maybe defined as less than three responses within a 12 hour period.
 - D. **POST** the next discussion question:
 - 1. After there has been insufficient responses to the answer to the previous question or
 - 2. Discussion of previous question & answer drops to zero within 6 hours of the last posting.
 - E. All members of a group must have available to them at all times, the questions and answers from all group members, so that:
 - 1. In case a previous question goes unanswered, you may respond by giving the appropriate answer, even if it was not your question.
- II. Policy for posting questions and answers.
- A. Please proof all postings for any grammatical, typographical and or punctuation errors.
 - B. Post topic of the week in the subject heading of all postings.
 - C. Construct all postings in Q:/A: format (include the questions you are responding to above your message).
 - D. The group for the next topic (week) is responsible for developing and posting a "transition post"
This post is made up of:
 - 1. Three-four sentences, briefly introducing the next topic and its connection to the previous topic.
 - 2. Format: "For the _____ week, our topic will be _____. This health communication topic will focus on these three major concerns. The first concern is _____, the second issue is _____."

Using Technology Resources to Teach World Theatre

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Abstract: This presentation discusses the creative use of today's technologies to teach world theater. Compared with western theater, world theater demands a broader access to information than is generally available. The goal of this course is to compare various forms of theater using materials and human resources available only through technology. Students and faculty use email, the world wide web, and distance learning venues to gather, research, and catalog world theater resources as well as to interview experts in specialized areas. The presentation includes a discussion of the advantages and challenges encountered in teaching theater with new technologies.

Overview and Justification (Scott Boyd)

The original development, and the ongoing alteration, of this world theatre class came about out of a twofold necessity. First, the notion of teaching an upper division/graduate level course in world theatre simply cannot be done in a thorough manner when speaking of traditional teaching methods. Austin Peay State University, like many other institutions, has limited resources. Among these limitations are the number of faculty, the size of the library collection, and the overall firsthand experience and research in terms of world theatre. We needed to explore other venues to help us have better access to a wider range of information than our current resources.

Secondly, we at Austin Peay State University have begun to assemble the technology of tomorrow into a distance learning center to help us with the task of education today. While we have been using the technology in our distance learning classroom to tap into various resources on an "as needed" basis, we had never used it as the sole vehicle to research, gather, categorize, and disperse knowledge for a semester-long course. We had never really put the distance learning center to the test. The missing piece for each of these puzzles seemed to warrant a perfect match between the two. This was the starting point for the development of the course.

We decided to structure the class in a seminar approach as opposed to the more traditional lecture approach. By using technology resources, we would be receiving input from a variety of resources by way of several venues. This nonlinear gathering of information lends itself to a more fluid exchange of ideas instead of the disbursing of information along a one way venue. This format allowed for more hands-on work by the students in terms of exploring the many aspects of world theatre. It also created the opportunity to actively engage in technology resources as a means to a wider range of knowledge than is currently available in most traditional approaches.

One of the many side benefits to this course is the idea that our students are being trained in technology exploration as well as the practical use of the equipment. This benefit is not limited only to the research aspect of education, but also includes the presenting of ideas, theories, and conclusions. This is accomplished in a series of graded presentations. These presentations include summaries and bibliographies that are posted on a class listserv. Follow up questions and discussions also occur on the listserv. This brings us to yet another benefit. With this approach, we have virtually eliminated the paper aspect of this course offering. There is no textbook. There are no written tests. All written correspondence is accomplished by means of the class listserv.

The Class Itself

We began the semester by giving a brief overview of the equipment available in the classroom. After this overview, we then began a hands-on exploration of various world wide web sites. This allowed the students to get actively involved with the technology and learn quite a lot

through the trial and error of diving into the world wide web. This gave them that ever important, first hand experience of finding the various dead ends and misconnections that we all have encountered while exploring the internet.

After this initial surface exploration of the world wide web, we divided the remainder of the semester into four differing aspects of world theatre; spoken theatre, sung theatre, movement oriented theatre, and then various combinations of these. With each aspect, we briefly discussed our American theatre heritage to give us a starting point in our world theatre exploration. After this, we then began looking at various regions of the world to discover their heritage and to compare this to our own. Following this step, our students gave brief presentations on other elements, regions, and cultures in terms of world theatre that were not yet covered in class. Throughout these presentations, comparisons between their research and the research of others in the class were constantly being made. This enabled us to achieve a better understanding of our theatre heritage and its place in world theatre heritage. Dr. Jones will now discuss the various resources employed in this class approach.

Resources for World Theater (Ted Jones)

There were a number of technical exchange capabilities we wanted to explore for world theatre in this new environment. Related to technology, our goal as teachers was to remove ourselves from the information spotlight as "sages on the stage." The idea was to serve more as "guides on the side"--to help students explore world theater topics through technical resources. As theatre students are generally not technology oriented, nor are they particularly interested in technology, the challenge was to see how much of the technology would prove useful. We are fortunate in that theatre students are accustomed to working in what seem to be unstructured settings, as these are a necessary part of the creative aspect of theater. Their trust of their teachers and willingness to undertake being graded on how well they used these utilities is commendable. (Actually, we did lose a couple of less hardy souls who panicked after the first week.) The technologies used for the class include various email components, the world wide web, and the distance learning system we are using in this presentation for access to human resources not available on campus--our guest presenters. I would like to define each of these briefly as they relate to the course, give examples as they apply, and discuss how each application has proceeded thus far.

To begin, email and listserv. I think everyone here probably knows the basics of email; however, listserv may be less familiar, particularly as it is used in course work. In general, a listserv consists of a group of individuals joined via email to receive messages posted about a topic of mutual interest--in this case, the world theatre class at Austin Peay. It operates very simply. A message addressed to the listserv is automatically sent to all subscribers. Any reply to this message is also sent to everyone; and the messages are numbered, so it is easy to tell their order. The basic listserv function is to extend the classroom forum outside the time and space limitations of the class meeting itself. Thus, if time runs short and materials meant to be covered in class were not, they could be made available via the listserv. Bibliographic sources used by

students in their presentations are required, and these are distributed to others in the class via the listserv, along with project outlines and presentation notes. Comments, questions, and calls for help all make their way onto the listserv, along with some unanticipated postings. For example, after her first login, one student sent a test message in the form of an original poem she wanted to share with the class. The inevitable technical snafus result in pleas for assistance and responses from the more technically savvy listserv members. One unanticipated plus we discovered is that a large text file located on the world wide web can be emailed directly to everyone in the class by means of the listserv. One student came in a panic one day, needing to download a cyberspace interview with composer Stephen Sondheim to distribute to the class. He was amazed when I showed him how to call up the file and email it to the listserv. Students can then read and file the message or delete it as they desire--all without expensive paper copying, collating, stapling, and distribution.

Postings to the listserv have included exchanges on the relationship of life and art, recommendations of good web sites for particular playwrights, class assignments and discussion questions, guidelines for quoting electronic sources in a bibliography, point incentives for using the listserv, and even class input for this conference presentation. To date there have been more than 175 postings to the class listserv. Private email messages from the teachers to individual students are also used to make topic recommendations and to deliver grades and feedback on individual projects.

The world wide web, the internet with pictures, is available in our classroom and can be viewed via the monitors you are watching us on. In fact, you will hear some discussion of how students used the world wide web for presentations in just a few minutes. We were particularly interested in making the world wide web available to students, as we felt it would be an ever more vital resource for world theater and one we wanted our students to know how to use. The first presentation assignment was to find a world wide web site related to the arts in general and to demonstrate it for the class, noting the outstanding characteristics. It was during this first presentation that students found out how wonderful technology can be when it works and how disappointing when it doesn't work, or is slow. At present, the world wide web turns out to be a resource with more promise than substance as far as world theater is concerned. Commercial sites and academic sites are not distinguished from each other. So, a word search using the title of a play by British author Caryl Churchill may turn up well over 100 cites; but most of these are likely to be nothing more than billboard listings of the play as part of a theater's season. Other sites may have wonderful video clips (if you have the required software installed on your machine) and unique materials unavailable elsewhere. For example, we found a particular website on Kabuki theater contains an essay written by a Japanese actor specializing in female roles in Kabuki. Useful photographs, and a few interesting links that lead to related websites at the click of a mouse, are becoming more common. Information on the www is often quick to find but variable in content and quality; and, for the time being, the best and richest research is still to be done in the library.

This brings us to the technology that is connecting our two sites presently, the compressed video technologies used in distance learning. Originally this course was planned to connect our room with the distance learning room at Tennessee State University. One instructor, Scott Boyd, has taught at TSU in the theater department, as his wife does presently, and he lives in Nashville. They had agreed to pilot this class as an initial course shared between our two universities--something the Tennessee Board of Regents universities have not yet done. When this did not work out, I agreed to join Scott to teach the class here because of the interest students had indicated in such a course. Actually, as far as presentation goes, the technology works pretty much the same whether you have another site connected or not. It is in the interaction component that the other site becomes significant. To present their class projects, students learned the basics of camera selection, how to use a document camera to store digital slides and show photographs and www materials, and how to integrate the VCR. In fact, you will see a demonstration of some of these shortly in the form of an abbreviated presentation.

It is perhaps fortunate that our planned sharing with TSU did not occur when it was planned. Our particular room is operating on the leading edge of technology in that the phone lines connecting our two sites are not all Bell lines; once they reach the Austin Peay campus, they run through our campus phone switch. No one else is doing this at present. Sometimes when you "beta" test, the leading edge becomes the bleeding edge. The point is, we have had some technical issues to arise that are still under resolution, but now we are finally able to bring human resources in from distance locations to work with our students. Planned sessions include a presentation from TSU on African theater and a session on Alexander movement technique from Appalachian State University in North Carolina. A lecture on the carnival tradition in Trinidad is also being considered with the University of Memphis.

We have been able to benefit in the course from locally available expertise, however. The world theatre class has had guest lectures and demonstrations by five APSU faculty members and one visitor from Nashville. These have covered subjects from playwright Wendy Wasserstein to Chinese Opera and a demonstration lecture on Hindu dance. Besides offering students the benefit of each professor's expertise, we hoped to give our colleagues the chance to explore the technology briefly in a collegial environment.

We will now shift our discussion to an overview of how a student researched a presentation on sung theatre.

Billy Budd (Tanya Olson)

(This part of the presentation was accompanied with displays of web pages, digital slides of production photographs, and a brief video segment from the film *Billy Budd*.)

After receiving presentations on sung theatre by Dr. Jones, Prof. Boyd and guest faculty, students were to present projects on sung theatre as well. I chose Benjamin Britten's opera, *Billy Budd*, which was based on Herman Melville's novel. The first place I went to gather my

resources was the World Wide Web. The two most useful articles I found were on the novel and on a description of the set design for the opera. All I knew was that *Billy Budd* took place aboard an English warship. This second web site provided me additional information about the set, which was especially useful, as I could not find any pictures of the opera set.

After exhausting the Web sites, I searched the library for resource materials. There, I found the *Billy Budd* novel, play, movie, and opera score. Unfortunately, there were no recordings of the opera. I even looked at a couple of music stores, but came up empty handed.

With Britten's opera score and all the other resources, it was my task to combine these elements into a presentation on sung theatre. I had a lot of information to present; but the big question was, how could I present *Billy Budd* in a concise but thorough manner in a small amount of time. As "a picture is worth a thousand words," I took a very visual approach.

One of the key elements to understanding *Billy Budd* is its historical setting. By using *Harvard Graphics*, I designed a time line of what was going on in England during the late 1700s. This is how I began my presentation.

I then moved on to explaining the three main characters by showing pictures of them saved in a digital format. By using the zooming and focusing features, I saved the slides the way I wanted them to be presented. Saving the slides ahead of time not only saved me time during the presentation, it also avoided a distraction caused by zooming and focusing on the pictures during my presentation.

Finally, I completed my presentation by showing a clip from the videotape dealing with the court martial of Billy Budd. As the court martial was crucial to the story, showing my classmates this scene via video tied it to the visual approach of my presentation.

Overall, the new technology and in class seminars aided me a great deal in both research and presentation.

Views of the Students (Beth Duncan)

(The following comments were solicited and collected by one of the student presenters, Beth Duncan, from members of the class for purposes of this presentation.)

Advantages to this particular approach to teaching world theater:

Students have the opportunity to learn about technology while studying a subject they enjoy thus helping us to overcome technological fears. The new technology and access to the world wide web provide more resources and up to date information on world theater topics. The listserv allows students to develop interpersonal relationships with the instructors outside of the classroom and gives them the opportunity to expand upon topics discussed in class.

Students are able to hear from a variety of specialists in different areas such as Chinese Opera, Hindu Dance, and performers who have worked in specialized fields, such as opera. They also have the opportunity to draw on the knowledge, experience and interest of students in the class. For instance, one of the class members studies fight choreography and was able to present a session on stage combat during the movement oriented theater presentations. Two other students visited London during December, 1995 and were able to discuss their visits to London theaters.

The class gives students the opportunity to break away from the normal class structure and to be involved in the teaching and learning process.

Disadvantages to this approach:

Having never used computers or the internet before, many students felt intimidated by the equipment. Extra time has to be taken from the class to learn how to use the technology presented. Computer workshop days were suggested by almost all of the students from this class.

More technology means more possibilities for mistakes during presentations, such as pushing a wrong button or thinking all of the slides are saved and finding out in the middle of a presentation that they really are not. Another problem arises when needed world wide web sites are not accessible on a given presentation date.

In their presentations, students are required to use two means of technology. This means extra research has to be done in order to find pictures, videos, and web sites to present. Videos and pictures are not as easily found as written information. Extra preparation time is needed. Students have to plan to be finished with researching their presentations one day in advance in order to get into the distance learning room to set up and practice. Unlike regular speeches, which can normally be practiced anywhere, world theatre projects require the distance learning classroom equipment for preparation.

Being able to cover so many topics means the class doesn't delve into them very far. Some topics are explained in detail, while others are briefly mentioned.

Some students feel that questions and responses become overwhelming on the listserv. They feel that a small class is almost essential in using the listserv to its fullest potential. (Note: The instructors feel that as there is no text to read, most of the print material for the class is made available through the listserv. Therefore, the listserv postings replace the time normally used to read the text and are not an additional burden.)

Conclusion (Scott Boyd)

In conclusion, the decision to use technology resources to teach this course in world theatre gave us many possibilities as well as quite a few challenges. The immediate access to information and reference materials, both traditional and non-traditional, has proven to be an empowering tool for both the students and the faculty. Accessing print and graphic material from around the world with a few keystrokes is amazing. These possibilities, along with personal experiences from other experts of a given field, make teaching by way of distance learning an exciting reality. However, along with all of the wonderful facets to this approach, there are several challenges that need to be addressed.

We have experienced a few technical difficulties this semester. The most common problem is the inability to access web sites quickly for a given presentation. This has forced the various presenters to have a back up plan ready at a moment's notice. Another problem encountered was the inability to complete a video hook up with another site. This occurred when we were to receive a lecture by from Tennessee State University. Due to this technical error, we had to postpone the guest lecture and scramble to fill the class period with other material.

The largest hurdle that we've been crossing this semester is the organizational aspect of scheduling guest experts. As you well know, handling your individual schedule within the confines of your institutional schedule is difficult enough. Handling the schedules of several lecturers who all work within other institutional schedules and then trying to coordinate it all into one overall class schedule is a bit of a nightmare. The need for understanding by all involved in this project was of the utmost import. Our students are to be highly commended for their patience during this exploration.

Weighing the positive and negative aspects of the use of technology resources in the instruction of world theatre, one realizes that the small headaches and hurdles encountered during the journey are more than made up for by the wealth of knowledge just around the corner. The idea that students at a small liberal arts university have the potential for the same instructional resources that are traditionally found in some larger institutions makes the pursuit of this type of distance learning a viable and desirable undertaking.



Track Sessions



Track 2: Distance Learning



Mid-South Instructional Technology Conference



Ethical Issues Relating to Teaching via an Interactive Two-Way Television System (ITV)

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Abstract:

The information age has introduced new methods of delivering educational materials to students. One method is the two-way interactive television (ITV). As more schools utilize ITV, certain administrative, legal, and ethical issues need to be addressed. This presentation and paper address the ethical issues that should be considered before undertaking this adventure, including: ownership of course, videotapes, and materials; copyright issues; uses of videotapes; data/media manipulation; reception and transmission of signals; class size; access to library resources; displacement of teachers; marketing; admission of students; faculty selection; student access to instructor; and training faculty to use ITV.

Ethical Issues Relating to Teaching via an Interactive Two-Way Television System (ITV)

The information age has introduced new methods of delivering materials to students and to classrooms. Distant education creates a unique opportunity for schools to extend their academic offerings to new audiences and at the same time address the issue of equal access. Distance education includes many formats, one of which is live, two-way interactive television.

Distance education means many things to many people. The world is changing rapidly as technology becomes a guiding force in information transmission, education, business, and training. Less than a decade ago, few states had any kind of real interactive learning capability. Now, every state is involved in this technology on some level.

Teachers, educators, and trainers are adopting new methods of teaching as older ways of instruction become outdated; or, they are using improved instructional strategies to supplement and enhance traditional teaching. Education has met these challenges by introducing computers, Internet, e-mail, fax machines, the information highway, and two-way interactive television into the schools. We are the telecommunications generation, the computer generation. It is important to remember that distance educators represent a potentially huge constituency — every school child, every college student, every business person, every adult is part of the national audiences whose informational and educational needs can be accommodated by means of distance education systems, methods, and practices.

Types of Activities

ITV can and is used for a number of types of activities. Educational institutions as well as businesses use ITV for meetings; this may be either a live, two-way interactive system or a video conference. ITV is also being used for continuing professional education programs and workshops, making it more convenient, especially for people living in rural locations, to fulfill their education requirements. In addition, business and industry introduce new products to branch offices, sales representatives, and even new customers via ITV or videoconferencing. The other type of activity, the one which is probably most familiar to many of us, is the offering of academic courses via interactive television systems.

Reasons to Use ITV

Two-way interactive television (ITV) is not a new concept, especially to rural teachers who rely on this medium to bring sources of diversity, updating, and advanced levels of course work to their students. This technology means rural schools can remain geographically isolated without becoming intellectually deprived. Television has introduced the power of images and sounds to an instructional process that was once primarily printed and written. Television is no longer accepted as just a means of entertainment, but also as an important part of classroom instruction. Today's students have grown up in a highly graphic environment, exposed to computers, television programs, network systems, and other technologies. ITV is a natural.

There are many reasons to use ITV in education, including the following:

- to increase accessibility to higher education;
- to offer a more comprehensive selection of upper division classes to meet the needs of transfer and non-traditional students;
- to enhance the offering of continuing education courses, workshops, and seminars;
- to increase class size in vital and essential courses;
- to improve retention of students by offering a variety of courses;
- to broaden students' backgrounds by exposing them to culturally diverse populations at other sites;
- to more effectively use time and travel money;
- to increase visibility and cohesiveness and reduce the cost of sharing invited campus speakers that may otherwise be cost prohibitive;
- to meet people's needs for convenience and quality in education;
- to enhance and expand learning by accommodating different learning styles; and
- to provide on-going education, especially when it is "the only game in town."

These justifications for ITV use in an academic setting are in no way all-inclusive. They do, however, provide a better understanding of why states, school districts, schools, departments, and instructors may find ITV an effective means of course delivery. As with all good things, inconsistencies and misuse may directly or indirectly impact ITV usage at a school. There are many issues which impact ITV — administrative, legal, ethical, or a combination of two or more. Ethics must be included in the ITV considerations.

Ethical Issues Related to ITV

Ethics may be defined as a point where the accepted rules no longer serve, and the decision maker must weigh values and reach a judgment in a situation which is different from situations faced previously, and this can certainly apply to ITV. Frequently, the administrative/legal/ethical issue is difficult to separate. It is the distance education philosophy that supports the "classroom without walls" concept. What is acceptable, legal, and ethical in a regular classroom is usually considered permissible in an ITV classroom; there are, however, certain issues in ITV which may or must be addressed separately from regular classroom instruction.

Ownership

Ownership of the course must be addressed. Once this ownership is established between faculty and administration, it is wise to have a letter of agreement between the parties which identifies the status of the course. In the event the faculty member leaves the institution, does the course (and materials) stay at the institution, or does the faculty member retain ownership? In the event there was no agreement regarding ownership, the institution may feel it has ownership of the course and materials because the professor developed the materials while in the employment of the institution.

Another issue to ponder has to do with ownership of videotapes of courses. Frequently, faculty will videotape each class session and retain this copy. Once again the question of ownership arises. One college professor has included the following statement in the course syllabi:

The classes will be videotaped. The videotape is the property of the instructor

Some faculty have provided the blank videotapes to guard against the institution maintaining tapes were the institution's property because it supplied the tapes.

Ownerships of materials is a sensitive issue to many faculty. Because the course design and materials development requirements are different between ITV courses and traditional courses, a great deal of time may be involved in restructuring an existing course. When the faculty member leaves, who maintains ownership of the materials?

Copyright

Copyright — that beast which continually raises its ugly head to haunt teachers. Fair Use provisions of the Copyright Law are so complex even lawyers consider some areas confusing and vague. On January 1, 1978, the General Revision

of the Copyright Law went into effect. It has been determined that ITV materials are bound by copyright regulations.

The following recommendations regarding use of print and non-print materials with ITV should be considered:

- When in doubt, get permission. Stay within the confines of the law, even if you suspect this comes under the Fair Use provisions.
- Although Fair Use guidelines relating to ITV are still not clearly delineated, it is wise to seek permission to use materials. The technology is relatively new, so there have been only a few cases in course which have been precedent-setting decisions. Even though courts have looked at Fair Use cases on an individual basis, the gray area(s) still exist.
- Many telecourses are made with the intent to sell and distribute multiple copies, which put these telecourses outside the interpretations of Fair Use. Give careful consideration to purchasing telecourses and making them available to others.
- Be careful, be cautious. Most copyright holders will give or sell permission for a license for copying and transmission, so pay the fee and pass the cost on to the "customers," usually the students. It is advisable to keep exact records of permission received and fees paid.

Institutions should develop policies and procedures to address copyright issues, disseminate these guidelines and policies, and implement them through on-going training sessions.

Videotape

The issue of videotaping classes and students has been discussed in great length, but it is still a gray area to many. The issue is **not** whether a videotape is made of each class session, but what the professor does with the tape that constitutes the critical issue.

Although it is not imperative to have signed permission of the students to tape the class, it is a courtesy to inform students that each class or certain classes will be videotaped. In the event these tapes may be viewed by people who are not

members of the class, the instructor should definitely secure signed permission from each student. As a safeguard, this may be done as part of the introductory procedures during the first class session.

Another videotaping issue is that of removing the videotapes from the classroom environment and using them during conference presentations. This is an aside from the usual purpose of videotaping a class, i.e. review and remedial work. In the event a tape is used outside the classroom, the teacher should get written permission from all persons shown on that particular segment of the videotape.

One more ethical issue addressed the "boot-leg" videotaping of classes, either at the instructor's location or another one. Because technology is so advanced and our students are much more adept at using equipment, it is relatively easy for unauthorized persons to make videotapes of sessions.

Data/Media Manipulation

Once material is transmitted via the live, two-way interactive television lines, it is available for videotaping at many of the sites "on line" for that session. Because of the ease with which data can be manipulated, material revisions can be an advantage or a disadvantage. A faculty member can update and revise recorded materials; however, the disadvantage is that unauthorized persons can also manipulate information, especially when it is video recorded. Either taping over the original material or "piecing together" (often called editing) a new videotape can result in new material being prepared — by the instructor or some unauthorized person.

Reuse of Videotapes

On occasion, institutions have rebroadcast entire courses in subsequent years. The faculty member who designed, developed, and delivered the course was videotaped each session and may (or may not) have been informed that the course would be rebroadcast in later quarters, semesters, or years.

What are the ethical issues here? The faculty member knew each session was being videotaped, but was not told of the intent to broadcast the course again at a later time. It seems the ethical issue at hand here is the use of the videotape while the faculty member received no remuneration during subsequent years during which time the course is being rebroadcast. The rationale to rebroadcast rather than offer the course again with a "live" instructor may be due to budgetary reductions and pressure to increase revenues.

An issue which is important to post-secondary education faculty is the use of course videotapes to provide input to administration for retention, promotion, and tenure decisions. This can be especially worrisome if the faculty member was a new user of the ITV system and experienced difficulties with the system or had

evaluations which were lower than usual because of student dissatisfaction with the ITV technology.

Reception of Signals

Normally, a person would expect to pay a fee for ITV courses or events, whether in the form of registration fees or tuition. By gaining unauthorized access to transmission, the user is skirting on the edge of illegal behavior. Frequently no-charge programs or courses are available, with the understanding no fee will be charged. In that case, the receiver should not turn around and charge the participants for this transmission.

Another form of unauthorized reception is an institution which pays the appropriate participation fee but shares the signal with other locations in the area via an outgoing system. Although this approach is not highly ethical, it can be justified by one definition of distance education: a classroom without walls. Needless to say, one person's definition of a classroom may be greatly different from another person's definition. Networking is another example of this type of reception.

Transmission of Signals

Transmission and reception of signals are very closely tied together. Some institutions have the capability for down linking transmissions and simultaneously rebroadcasting to an entire system — with or without the permission of the originating group. Once again, it is questionable whether fees can and should be charged to the other locations when signals are transmitted to other locations.

Class Size

In just about all teaching situations, class size is an issue. When class size is determined prior to registration, a cap is set at 15, 25, 40, or some such number. The question arises, then, whether an ITV class with a cap of 20 students means a maximum of 20 students at each of the locations or a cumulative total of 20 students from all sites. Total count or count at each site can be an interpretation problem for some people, but the instructor may look unfavorably at a class intended for 25 now has 75 enrollees.

Access to Library Resources

Outreach is becoming quite important to many institutions, to the point some have included this activity as part of the institutional mission. As outreach increases, especially as it applies to ITV, questions about library resources and access will continue to grow. If students do not have access to on-campus or off-campus

library resources, can the same assignments be required of them. Will the course standards be compromised to accommodate the lack of access to resources and services? Will the integrity of the course grade be in question if students take course via ITV?

Displacement of Teachers

Concern has been expressed that ITV will replace teachers. The intent of ITV is to make accessible information and courses which would not be available otherwise to students. Although ITV saves travel costs and time, it is not without cost. The system costs money, so administrators and school districts will want to utilize the systems whenever possible. However, as school budgets continue to be scrutinized and cut, teacher displacement is a major concern of teachers, teacher training institutions, and potential teachers. Displacement is always a possibility; however, program restructuring or additional course offerings may be a positive impact of implementing ITV in a school.

Marketing of Programs

As with any new or existing academic program, marketing is often necessary to either build or maintain enrollments. This is especially critical as administrators seek ways to reduce budgets, frequently by eliminating courses, programs, or departments which have low student enrollment. Whose responsibility is this marketing endeavor — the school's or the instructor's? Another ethical question which needs to be considered is whether marketing efforts to "sell" ITV courses to students, done by highlighting the advantages and downplaying its disadvantages, is fair to potential students. Students need to know both the strengths and weaknesses of ITV before committing to a course or program. Or does *caveat emptor* apply — let the buyer beware!

Admission of Students

ITV requires a special commitment on the part of the student. Self motivation, self-directedness, and psychological readiness are necessary for success. Students need to be aware of these special criteria prior to enrolling in ITV classes. In some cases, students can be counseled prior to the start of an ITV course to prepare them for the differences. Whose responsibility is this counseling?

Training Faculty to Use ITV

There is a need for training faculty to use the ITV system. Some pre-service activities teacher students about ITV, while in-service sessions may be provided to teachers already in the school system. It is imperative, however, that teachers look at ITV training as more than just "pushing a few buttons" so the information is

transmitted. Appropriate time for training as well as course and materials development is critical. It would seem appropriate for components of ITV training to include: a brief overview of the system, course design and development, materials design and development, operation of the equipment, computer interaction with ITV, and the administrative, legal, and ethical issues which must be addressed.

Selection of Faculty

Selection of faculty to teach via the ITV system is not as easy as it might initially appear. Some faculty, knowledgeable in their field and the course content, are more comfortable in a traditional classroom environment than in an ITV room, complete with all the technology that accompanies teaching via ITV. A major question to be considered is whether the non-technical faculty member should be required to teach via ITV, especially if that person has indicated concern about using this medium of course delivery.

Characteristics of effective ITV instructors may include: an ease with and understanding of technology, a willingness to take a risk with a new methods of instruction, willingness (if necessary) to redesign courses to include less lecture and more experiential classroom activities, ability and willingness to design or redesign course materials to fit the ITV format (transparencies, computer-delivered presentations, etc.), troubleshooting capabilities, and flexibility in the event of equipment failure.

Another issue within the category of selection of faculty is whether the ITV opportunity is viewed by administration, department heads, and faculty as a plum or a prune — a reward for work well done or a punishment. Or, is the driving force of faculty selection program needs, preferences/wishes, or additional remuneration or time for ITV teaching.

Student Access to Instructors

With ITV classes (according to most definitions of distance education), the faculty member and at least some of the students are located at separate locations. When that is the case, additional effort must be made on the part of the faculty member to make student access or contact possible. Experienced ITV instructors have found that although this may be a cumbersome task, faculty access is critical. Because students are usually located a distance away from the instructor, "dropping in" is not usually a possibility. Other options, however, include establishing a standard time for office hours to be held via the ITV system and/or establishing e-mail communication access whenever possible.

Conclusion

ITV has been a tremendous boon to the field of education for a number of reasons. It has, however, tempted professionals to "skirt the edge" of both the law and ethics. Technology, the ease of operation, and the vast number of technology-oriented people permit legal and ethical violations or "crossing the fine line" possible. It is better to lean more towards the conservative side when contemplating ways to enhance classroom instruction by using ITV.

**Faculty Development Programs
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Abstract

Faculty development activities often focus on improving teaching and learning. The paper reviews, first, distance education literature that describes the major teaching and learning issues for faculty development and, second, describes a rationale for formal faculty development programs for interactive television programs.

Faculty development activities often focus on improving teaching and learning. The literature on interactive television and distance education describes skills and knowledge that faculty should have in order to teach well, including skills in effective course planning, using computer and multimedia technologies, and evaluating student performance and knowledge of appropriate instructional methods; the importance of interaction between faculty and students; students' learning styles, behavior, and motivation; and the roles of distance education staff. Faculty development also includes broader issues, e.g., commitment from university administration to support faculty development, sensitivity to faculty needs and financial and staff resources to support an institution's interactive television program. This paper will, first, review distance education literature that describes the major teaching and learning issues for faculty development and, second, describe a rationale for formal faculty development programs for interactive television programs.

Current Faculty Development Efforts in Interactive Television

In a traditional classroom setting, faculty usually work by themselves to prepare their courses. In class, faculty teach and students learn face-to-face. However, faculty who teach interactive television courses often have to update their skills in current technology, plan courses differently, and work with distance education staff to prepare and deliver courses. The literature on faculty development for distance education deals with several major teaching and learning issues. The literature describes many different facets which practitioners and researchers have studied; apparently, however, no typical faculty development program for interactive television exists. A brief review of some of the major areas for faculty development in distance education follows.

Effective Course Planning

In planning instruction for distance teaching, faculty did not have procedural planning skills (e.g., lesson and curriculum planning skills), did not make assessments of their students, and did not know how students learn (Wolcott, 1993). "The instructional design of the course was driven by a preoccupation with *what* to teach" (p. 29). Faculty were thorough planners and approached planning based largely on their experience in teaching. In planning instruction for a distance education setting, faculty engaged in course or term planning (comprehensive planning) from general to specific, identifying course content first and methodology second. Faculty focused on selection and sequence by defining the content and then matching the content with available time. Because content drove course development, students were a low priority in planning instruction.

Gehlauf, Shatz, and Frye (1991) studied the differences between faculty's instructional methods in a regular classroom setting and those used in interactive television. After faculty learned about their distance education environment, many realized that there were limitations (e.g., reduced spontaneity) and that interaction with students was important. The interactive television setting required faculty to reassess their instructional methods and overall course planning. Egan, Sebastian, Welch, Page, Nkabinde, and Jones (1993) stated in their discussion of preparation and planning, "As a rule, instructors thought that the preparation for teaching on television was far more time and effort intensive than preparing for conventional teaching" (p. J-2).

Flannery (1991) discussed adults' expectations of instructors and the learning style preferences of part-time adult students who were resuming their graduate education. Flannery concluded "... that adults expected an instructor-centered classroom" (p. 40); "... students expressed a high preference for clearly organized coursework and specific information on expectations, assignments, and course requirements," (p. 41); and that faculty need collaborative skills which "can be defined as those qualities which facilitate satisfying both the needs of the

instructor and the needs of the learner for pursuing professional knowledge and applied interests" (p. 42).

To summarize briefly, effective course planning emphasizes how instructional methods correspond to students' learning styles. Students' characteristics and needs should be a stronger focus when faculty plan their distance education courses than appears to be the case.

Student Learning Styles, Behavior, and Motivation

As the teaching environment changes for interactive television faculty, students experience a similar shift in their learning environment. These shifts affect students' learning style, behavior and motivation. For example, Cunningham and McLemore (1994) looked at the effects of interrelationships among students and faculty, as well as student motivation in distance learning classes. Students' attitudes toward learning are influenced by teachers' "immediacy behaviors," a communication research term used by distance learning researchers. Immediacy behaviors include a faculty member's personal and instructional skills. For example, faculty should show enthusiasm for their subject, display humor when appropriate, demonstrate that they are students of technology, develop rapport with students, respond to student needs (e.g., favorable comments for students' work), and learn students' names. Cunningham and McLemore also concluded that technology should work properly; "... it should not impose significant restrictions on the learner" (p. 11).

Egan et al. (1992) described how faculty found solutions to problems with student interaction. Some faculty established discussion groups which allowed students to interact with each other. A few faculty worked with study groups.

Discussion groups provided instructors and telecourse students with periodic opportunities for face-to-face interaction which is more typical of conventional teaching. Additionally, these groups (e.g., discussion groups) gave instructors opportunities to assess the degree to which their instruction impacted their students' thinking and behavior (p. J-4).

Barker and Dickson (1994) stated that students' interaction with faculty is important. Students need access to faculty outside of class, feedback on assignments and grades, and a sense of group cohesion in the class. Moore, Burton, and Dodl (1991) stated that technology was not a product, but part of a process to deliver instruction.

Faculty surveyed by Egan et al. (1992) cited the important link facilitators at off-campus sites provide. "[Facilitators] contribute to the emotional and psychological well-being of students whom they serve" (p. J-4). Facilitators are local contacts for a course, faculty, and the institution. Research by Cunningham and McLemore (1994) found that student achievement is enhanced by interaction with facilitators because facilitators manage the logistics. This in turn gives instructors more time to focus on instruction. The role of a classroom facilitator at the college level will vary depending upon the instructional methods of the faculty, the level of a course, the number and level of students at the site, the type of transmission system used, and facilitators' assigned duties.

Teaching Effectiveness

A recurring theme in the literature on teaching effectiveness relates to personal and instructional skills in a traditional setting and in a distance education setting. Concerns about quality of instruction, unfamiliarity with distance learning, and misperceptions of the use and benefit of technologies are key issues (Gunawardena, 1990). "Training will break down feelings of insecurity and fear of the new technology; faculty will also learn to use the television medium effectively" (p. 42). A key benefit of training is that it allows faculty to remain in charge of instruction in the classroom. Similar conclusions were drawn by Egan et al. (1992). For example,

the availability of an instructional designer and production and technical staff support was instrumental in faculty's feeling comfortable teaching on television. Faculty should become familiar with and practice with equipment well before their course starts; issues of pedagogy should be addressed, and faculty should know what system support is available (e.g., what facilitators at off-campus sites and production staff can do) and how to handle class when technical problems occur (Gehlauf, Shatz, and Frye, 1991).

To teach effectively, faculty should be aware of their own teaching behaviors in an interactive television environment. Barker and Dickson (1994) wrote that distance education faculty should be master teachers, have good presentation skills, and exhibit teaching skills found in the literature on teaching. Teachers need to look at new ways to plan and teach their courses. The Egan et al. (1992) summation on quality television instruction provides an excellent overview of teaching effectiveness:

[The critical factors in distance education] include competent instructors who are skilled in content knowledge as well as presentation skills; meaningful and timely interactivity that occurs among and between students, facilitators and instructors, learning support materials that foster engagement and interactivity; effective collaboration between and among instructors, course designers, and producers which culminates in visually interesting and instructionally relevant course sessions; careful integration of multimedia (e.g., video segments, films, graphics, etc.) which capitalizes on the strengths of television as a medium; and instruction that is responsive to students needs and produces positive student outcomes. (p. J-6).

Integrating visual materials with planned instruction to enhance teaching and student learning is an important aspect. For faculty teaching television courses, Egan et al (1993) found from their survey of instructors that "this training [in using visual materials] also created a greater awareness about the importance of selecting as well as preparing appropriate visuals (slides, video segments, etc.) for television teaching" (p. J-2). Faculty realized the limitations of routine lectures and found that audio-visuals enhanced their teaching effectiveness for interactive television (Gehlauf, Shatz, and Frye (1991).

Rationale for Formal Faculty Development for Interactive Television

Formal faculty development programs for distance education require institution-wide support for both faculty development and distance education from top administration. Higher education institutions have changed greatly in response to changes in students' needs and the federal government's efforts to increase access to higher education (Gaff and Justice, 1978). A huge increase in the diversity of students attending college for the first time has resulted in a demand for new programs and an expanded curriculum. Faculty development is an important method to accommodate any change caused by students, society, or federally mandated programs for education. "[Faculty development] was a means for reordering priorities within departments or across the entire institutions" (p. 86). Programs were established that focused on innovative approaches to teaching, advising and evaluation. Freedman, et al. (1978) observed that "No faculty development program can take place unless faculty members themselves want it" (p. 155).

Reasons for formal faculty development programs include: 1) to help faculty to adapt to new technology; 2) to review or renew emphasis on how students learn and the instructional methods faculty can use; 3) to draw upon distance education faculty's expertise to work with new faculty; 4) to tie distance education to an institution's educational and outreach missions, which should enhance the institution's posture in the educational community; 5) to show employees what resources are available for distance education; and 6) to provide a learning environment for students that is comparable to a traditional classroom setting. The last objective may be the most

difficult to achieve because of different perceptions faculty hold about teaching, student-centered learning, and how distance education students learn, especially adult learners.

An institution's attitude toward faculty development strongly correlates with an institution's sense of accountability for student learning and improvement in teaching.

Distance education revolves around a learner-centered system with teaching activity focused on facilitating learning. The teacher augments prepared study materials by providing explanations, references, and reinforcements for the student. Independent study stresses learning, rather than teaching, and is based on the principles that the key to learning is what students do, not what teachers do. It is a highly personalized process that converts newly acquired information into new insights and ideas. The institution's function, and the task of its instructional personnel, is to facilitate and enhance that process – despite the distance – to achieve optimum learning outcomes. (Beaudoin, 1990, p. 21)

Institutional Commitment

Because of state and federal support, Barker & Dickson (1994) believed that distance education is not a passing fad. "Due to an increase in distance education and its acceptability, administrators must deal with new issues and demands" (p. J-6). One issue cited is addressing faculty needs, including their adaptation to distance learning. For example, administrators should provide incentives such as extra compensation or extra consideration in promotion and tenure process for faculty who teach distance education courses (Gunawardena, 1990; Barker and Dickson, 1994). Administrators should also understand that teaching on television requires additional time for preparation and for visiting off-campus sites; they should make adjustments in faculty work loads to compensate. Usually emphasis within the institution is placed first on television hardware, and "the unfortunate side effect is that attention to the proper training and orienting programs often comes after the system is being used" (Gehlauf, Shatz, and Frye, 1991, p. 27).

Faculty development programs require institution-wide support with funds to sustain programs (Gaff and Justice, 1978). For an example that applies to distance education, Barker and Dickson (1994) described Western Illinois University's Faculty Development Technology Laboratory. "If faculty are expected to teach with new technologies, they must be provided with a proper facility and state-of-the art equipment and software to develop and produce instructional materials" (p. J-8). Only faculty have access to the laboratory at WIU and the types of state-of-the-art equipment available.

Five essential factors were identified by Olcott (1993) for universities and colleges that want faculty to participate in telecommunication systems: training, instructional support, extra compensation, adjusted teaching loads, and positive effect on promotion and tenure. To integrate telecommunication systems in extended degree programs, "... an institution's efforts to facilitate faculty adoption, establish instructional support services, and create an incentives infrastructure that formally recognizes faculty participation are crucial to the effective use of technology in extended degree programs" (p. 22). To encourage faculty to become capable at teaching distance education courses, Beaudoin (1990) stated that training programs "...must offer convincing, no-nonsense and on-going training that deals with how to teach at a distance, not merely how to manipulate new instructional technology" (p. 27). Also, top administration must provide leadership to "... to overcome resource limitations, remove structural constraints, and combat attitudinal barriers" (p. 27).

Summary

Several themes concerning faculty development for interactive television emerged from this review: 1) faculty need skills to adapt their teaching style for interactive television including instructional, personal, and collaborative skills; 2) improvement in teaching interactive television

courses requires a formal process of organized training programs; 3) training is beneficial for faculty; 4) teaching and learning in interactive television ought to be a shared experience between faculty and students; 5) faculty need to be aware of how their teaching behavior influences students' learning; 6) interactive television technology is a tool to be used and not an end in itself; 7) for future faculty development efforts, faculty and administrators should answer the following questions: Do all faculty know what good teaching skills are? Can faculty change their course planning to accommodate adults' learning styles? Can top university administration provide and sustain sufficient support, incentives, and resources for faculty to teach interactive television programs?

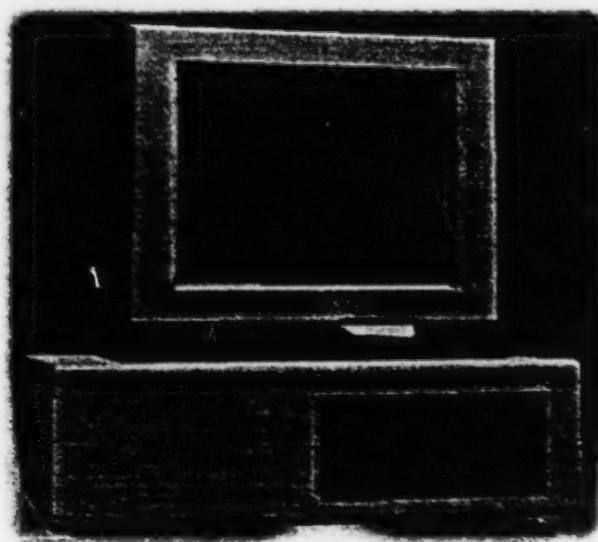
Areas for further study include defining the role and components of formal faculty development programs for interactive television. For example, interactive television faculty, staff, and administrators could define and evaluate the type(s) of institutional support already available at their institution and project any other support that may be needed.

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Distance Learning: Technologies, Curriculum Development and Teacher Education

This paper provides an overview of the numerous technological tools available to distance education teachers. It is becoming common to incorporate a variety of tools for design and implementation of distance learning programs. The distance learning environment is significantly different from that of a traditional classroom and therefore requires considerable reflection on the part of the teacher (Wolcott, 1995). Aspects of curriculum development and teacher education under such unusual circumstances are discussed.



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Introduction

Distance education is a broad category of education that strives to overcome the problem of teacher and learner being separated by some physical distance. Moore and Thompson (1990) state that distance education also involves focusing on the special nature of course design, learning, and instruction under such circumstances. The distance learning environment is important to study and understand since in the future it is not difficult to imagine that its presence might contain a significant portion of the educational community, considering the infusion of recent communications technologies. Along with the obvious advances in communication technology, one can attribute the increased interest in distance education to an emphasis in cost savings and changing demographics (Thach & Murphy, 1995). The distance learning classroom in many ways can be compared to the traditional classroom and considered similar, but there appear to be significant differences that warrant considerable reflection on the part of the teacher (Wolcott, 1995).

Examples

Given current expectations for encouraging lifelong, continuous learning, it seems logical to consider approaches toward the design of distance learning instruction which will engage learners as active participants in the generation of learning (Wagner & McCombs, 1995). I have tried to follow this philosophy while creating software for a liberal arts mathematics course delivered via distance learning. Figure 1 displays a screen capture of an interactive game that was used to promote student interaction. I also created some interactive problem solving situations to promote the generation of mathematical knowledge as well as student interaction. One example is displayed in Figure 2.

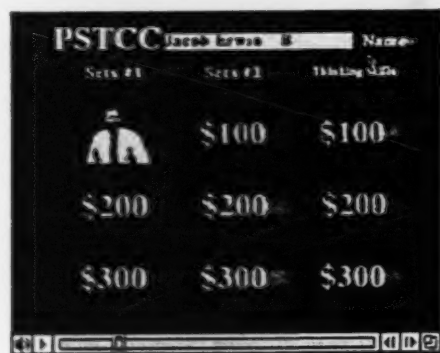


Figure 1



Figure 2

The Technologies of Distance Education

Print Tools for Distance Education

Print has primarily been the medium of choice since the introduction of distance education in the form of correspondence courses. Distance educators have used print in a variety of formats that include: textbooks, study guides, workbooks, course syllabi, and case studies. Why does print still play such a significant role in distance education given the "high tech" alternatives available today? Misanchuk (1994) offers some advantages for the use of print materials that might help answer this question.

- It is familiar to, reasonably well understood by, and accepted by learners.
- It is completely learner paced, i.e., "open."
- It can be navigated relatively easily.
- The technology is familiar to and reasonably well understood by instructional designers and subject-matter experts.
- No special facilities or equipment are needed; it is generally highly portable.
- It has a low unit cost (relative to the alternatives).
- It is a very efficient format for delivering large quantities of content.
- It is easy to revise, given word processing and desktop publishing.

Today's students, however, might not know how to make optimal use of print materials since their senses have been bombarded with multimedia-based information since early childhood. The use of print also severely inhibits interaction, is unable to display motion, and is expensive if color is necessary.

Video Tools

The introduction of a video component into a distance education program can be very effective since visual symbols can provide a connection between thought and experience. Instructional applications of video in distance education have been categorized by Oliver (1994) to include pre-produced video, televised instruction, interactive video, and videoconferencing.

The Cognition & Technology Group at Vanderbilt chose to use video in their situated learning based materials of the Jasper Series for several reasons (Cognition & Technology Group at Vanderbilt, 1992). They felt that it would be easier to make the information more motivating because characters, settings, and actions could be much more interesting. Another reason that they chose video was that the problems to be communicated could be much more complex and interconnected than they would have been using only written text. They felt that this was very important especially for those students that had difficulty with reading. Oliver (1994) also introduces some of the following advantages for the use of video in distance education.

- It provides visual access to a world outside the classroom.
- It is capable of simplifying complex, abstract concepts through visualization.
- It is familiar and "user friendly."
- Drama and documentary can stimulate thought and emotions.
- Simulations and role playing can demonstrate and model behavior.
- It can collapse time and space, capturing and relaying events as they happen.

Today's students, however, are conditioned by commercial television to be passive receivers of video information. Video materials for distance education are expensive and time consuming to produce, as well as costly to revise and update.

Computer Tools

Many industrialized countries introduced computers into classrooms on a large scale in the early 1980s. In the United States, both computer literacy and integration across the curriculum were emphasized from the very beginning. Unfortunately, however, much of the early software was an extension of programmed instruction and drill and practice types of activities. Even though the availability of computers was rapidly increasing, many teachers ignored the new technology

resulting in a very slow integration of microcomputers into classroom instruction. The computer has sometimes been viewed as a tool that takes some control away from teachers and turns it over to the students thereby lending itself nicely to distance education. The rapid growth in computer technology (communications and networking) along with the simultaneous rapid decrease in cost make computers an obvious component of distance education programs now and in the future. Some of the advantages of incorporating computers into distance education are as follows.

- They allow for examination of real world complex problems.
- They are capable of simulating experiences that could not otherwise be observed.
- Microworlds can facilitate exploration and discovery.
- Computers can be used to raise the level of thinking of students by overcoming the mundane calculations previously required to solve problems.
- Networking capabilities can put students in touch with worldwide databases and each other.

There still seems to be some anxiety involved, at least on the part of the teachers, in implementing the use of computers in instruction. Also, it is virtually impossible for a school to keep current computer technology in the schools.

Contemporary and Emerging Interactive Technologies

With the advent of new interactive technologies, educators are challenged to think of powerful, non-conventional ways to construct learning environments (Schwier, 1994). Large storage devices like computer hard drives, videodiscs, and CD-ROMs have made it practical to digitize computer graphic images, animation, video, and sound for random access retrieval. It is this random access to data that makes the learning environment interactive and nonlinear as opposed to video tape that is an example of linear media. Some of the advantages of interactive media as discussed by Schwier (1994) are listed below.

- They allow for different paths, individual learner needs and preferences.
- Strengths of several media can be combined into interactive multimedia systems.
- Students are actively engaged, resulting in increased cognitive investment in the content to be learned.
- Interactive media can be designed to provide immediate and relevant feedback to learners.
- They are cost effective to reproduce and convenient to distribute.

Interactive media can only simulate human interaction and does not have the power or flexibility to adapt to undefined or unexpected needs of students. Initially, interactive media are more expensive than other formats to design and produce.

Curriculum Development

Distance education is increasingly being delivered using combinations of the various tools previously mentioned. This forces an approach to teaching that requires breaking it into constituent parts (Moore & Thompson, 1990). Moore and Thompson state that, "some or all of these are prepared away from the learner, and communicated to the learner through the communications technology, with the possibility of interaction between the learner and an instructor also being through communications technology."

Designing distance education courses involves organizing and controlling the input of many specialists including subject authors, instructional technologists, graphic designers, video and other media specialists (Moore & Thompson, 1990). Moore and Thompson caution against the use of technology for technology's sake. They insist that decisions be based on instructional needs and goals, professional and technical expertise, and according to the available budget.

When determining course design, distance educators must be aware of the most recent technologies. For example, electronic mail, computer conferencing, and most recently computer videoconferencing can greatly enhance student interaction and participation.

While content and mode of delivery are key issues in the development of distance education curriculum, it is important that the materials help promote learner centered instruction. Given current expectations for encouraging lifelong, continuous learning, it seems logical to consider approaches toward the design of distance learning instruction which will engage learners as active participants in the generation of learning (Wagner & McCombs, 1995).

Moore and Thompson (1990) believe that certain principles of instructional design must be incorporated into the curriculum design process in order to obtain a successful teaching/learning experience. Some aspects of teaching that are taken for granted in face-to-face interactions are crucial in distance education. Moore and Thompson (1990) describe four "teletechniques" introduced by Parker and Monson (1980). The first is humanizing, which refers to creating an accepting environment that fosters feelings of rapport between teacher and students to help break down the obstacle of distance. The second is participation, which deals with the amount of interaction among participants in the teleconferencing classroom. Parker and Monson refer to the third teletechnique as message style. Message style involves the strategies that a teacher can use to generate interest and appeal in a presentation or discussion. Finally, they refer to the fourth teletechnique as feedback. Verbal and written feedback allow the teacher to determine the level of effectiveness of the distance teaching/learning process.

Teacher Education

Research and teacher education are essential to the development of effective distance education programs. Moore and Thompson (1990) offer the following three features most influential in requiring such research and training.

1. Distance education uses technologies that are unfamiliar as the primary media of communication for teaching to most teachers and administrators.
2. Distance education requires teachers to specialize in the various functions of teaching, especially those of: counselor, content expert, facilitator of interaction, course designer, and learner.
3. Distance education requires planning, development, production and distribution on a larger scale than is familiar to most teachers and administrators, and requires major intervention by policy makers at national and state levels.

There is a growing realization that traditional techniques of teaching are not as effective in the distance education environment. The need for distance teacher education is one which is echoed more and more in recent literature, especially as communication technologies become more sophisticated (Thach & Murphy, 1995).

Schön (1983) suggests that in reflection, teachers try to make sense out of uncertain and unstable situations. To analyze what goes on in a distance classroom, the teacher should reflect on the context, the learners, and the methods and procedures they employ (Wolcott, 1995). Reflective distance teachers can overcome some of the difficulties that arise in distance instruction by placing themselves in the situation of the distance learner. The distance learning environment is very

unique and requires considerable reflection. A distance teacher cannot expect the same pedagogical principles that were successful in a traditional classroom to be successful without adjustment in the distance learning environment.

Reflecting on my experience as a distance education teacher, it seemed that the technology lent itself to a rigid "school math" interaction pattern as described by Richards (1991). Richards refers to "school math" as the situation where students do not communicate directly with one another, and in fact never address one another. The teacher in "school math" remains in control and speaks every other turn.

Distance education teachers have to acknowledge the changed environment and its contextual influences (Wolcott, 1995). Distance education teachers must also be aware of the capabilities of the medium and work within them while adapting their instructional approaches to reflect the limitations of the medium. Wolcott (1995) offers the following suggestions for ways that distance teachers might acquire a feel for the context and experience of the distance learning environment.

- Talking with distance teachers and reading about others' experiences.
- Observing distance education classes, particularly from the students' point of view.
- Learning about the capabilities and limitations of the equipment and practicing with it.
- Talking with administrative staff, technical personnel, and site facilitators to become familiar with the routines and procedures.
- Talking with distant students to identify their needs and concerns.

Distance education teachers must be aware of the psychological, social, and technical obstacles that distant learners face. Distant students must take more responsibility for their own learning than in a traditional setting. The distant students must also overcome the intimidation of using the technology to interact with the class on a voluntary basis.

Thach and Murphy (1995) saw the need for teacher development in distance education, and believed that a list of competencies should be established that could be used to prepare teachers for the distance learning environment. They felt that the identification of specific competencies within the distance education field should be the initial step in creating an effective professional development program. The literature to this point had been based on the opinions of experts in the field. Thach and Murphy (1995) conducted a study of 100 distance educators and identified the top ten competencies. These competencies illustrated the dual importance of communication skills and technical skills as follows:

- (1) Interpersonal Communication,
- (2) Planning Skills,
- (3) Collaboration/Teamwork,
- (4) English Proficiency,
- (5) Writing Skills,
- (6) Organizational Skills,
- (7) Feedback Skills,
- (8) Knowledge of Distance Education Field,
- (9) Basic Technology Knowledge, and
- (10) Technology Access Knowledge.

It is interesting to point out that Catchpole (1992) realized that there are no professional journals on faculty development for distance education teachers.

Conclusions

Within the distance learning environment that includes cameras, microphones, and computers, communication is made possible between teachers and students where it once was not, but at the same time this technology also has the potential to inhibit classroom interactions. However, reflective distance teachers can overcome some of these difficulties by placing themselves in the situation of the distance learner. The distance learning environment is very unique and requires considerable reflection. A distance teacher can't expect the same pedagogical principles that were successful in a traditional classroom to be successful without adjustment in the distance learning environment. Also, and unfortunately, distant students must take more responsibility for their own learning in the distance environment setting than in the traditional setting.

Distance education can be delivered using various media and technological tools. It is becoming more common to use a variety of tools for design and implementation of distance learning programs. Professionals in the field of distance education cannot ignore how the rapid changes in technology can be used to their advantage. Research will be constantly needed and updated in each of the new and evolving forms of distance education delivery.

Distance learning technology does not lend itself well to changing methodology once a class session has begun. So, there appears to be even a greater need for distance teachers to stay with the "prepared script" and thus encourage traditional instruction.

In the future, there will be an increase in the volume of students that enroll in distance learning programs as well as the type of delivery systems that will be used. However, distance education is not, and will not be, for all teachers and students.

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Track Sessions



Track 3: Library Support



Mid-South Instructional Technology Conference



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Book It!

Abstract

On the Internet, you can not only buy books but also obtain information about publishers, and vendors, book reviews, authors, and any other book-related information. Even complete electronic texts are available for downloading or browsing online. This session will demonstrate Web sites where the book is still alive and well, whether you are searching for books on entomology, a genre related site for mystery fans, a bookseller specializing in rare books, or the newest books about the Internet.

It is the intention of this presentation to utilize Internet access to gain information about books. This will provide you with purchasing options and save you valuable time and effort. From your workstation, the Internet will place at your disposal the information necessary to reach a knowledgeable decision regarding print material. The best way to familiarize yourself with the available net sites is to get in there and surf, "hang ten"!

Commercial net addresses demonstrate some of the best, most current, and retrospective sources. Commercial indexes provide book information; facts for ordering, reviews, abstracts, and evaluations. Commercial sites also supply document delivery, downloading, e-mail, and printing services to their customers. Two popular and easily accessed sites are Infotrac and FirstSearch.

Infotrac is a product of the Information Access Company and can be integrated into your local library system. Copyrighted full text is available from numerous periodical sources. The text can be viewed, downloaded, or printed at a workstation. Book reviews are present with full citations, availability status, and material evaluation. Infotrac is a general index, covering many journals, popular magazines, and some newspapers. It is a product used by many libraries because it is easily searched and has complete help screens. Infotrac is a good basic book review resource available through your library and campus network system.

FirstSearch is a product of OCLC, Online Computer Library Center, Inc.. It is an interactive online information system that is accessible by subscription or password, which must be purchased for local use. FirstSearch is a comprehensive index providing citations from

research and academic periodical. This index is very large. Reviews are available as full text, abstracts, and notes. FirstSearch has an easy search strategy for users and provides excellent help screens. This database gives the options for document or e-mail delivery at a charge. Citations may be e-mailed without charge. FirstSearch Internet can connect through a campus net (Ethernet or Token Ring), a Web Page address, or a web browser. Before searching you will need a valid FirstSearch service authorization number and a password. The net addresses for FirstSearch are:

Telnet:fscat.oclc.org

<http://www.ref.oclc.org.2000>

OCLC web browser word search.

By working closely with the technology center and the library on your local campus, many things are possible. Commercial indexes will not solve all of your problems, but they can significantly reduce them. It is important to remember however, that the best way to learn the net, and its potential, is to just jump in and test the water. You won't sink and you just might swim.

FirstSearch. Ohio: OCLC Online Computer Library Center, Inc., 1995

Infotrac User Guide. California: Information Access Company, Nd.

Although predications abound concerning the end of the printed word, it certainly has not arrived. In fact, bookstores are doing more business than ever with new and larger stores that carry not only books, but software, tapes, CD's and other media. And ironically, if a book is not available at one of these megastores, it can probably be ordered from an online bookstore on the

World Wide Web. The Web has an abundance of book related sites, which fall into several categories such as discussion groups and reviews of current titles; book stores or sites that search for books; publishers pages with new titles and other services; sites devoted to a genre; and sites with the complete text. Of course there are other book related sites that do not fit into these categories exactly, and some sites contain so much information that they could only be classified as general or comprehensive sites.

One of these general sites is *Bookwire* which lists itself the first place to look for book information and the most comprehensive book site on the Web. The Navigator page is an index to all of the resources at this site which include, but is not limited to, book reviews, links to publishers, and the *Publisher's Weekly* list of best-sellers. Don't leave this site without looking at Bookwire's Best Bets for interesting and unusual book sites. Another comprehensive site is *IBS* or the *Internet Book Shop*. This site claims to be the largest bookshop online in the world. Along with many book titles and links to publishers, it includes excerpts from books, author profiles, and the ability to search *Whitaker's* British Books in Print. Especially helpful are the links to British publishers, if you are searching for a United Kingdom publication. Other comprehensive or general sites include one of the oldest and best book-related sites on the Web, the *Internet Book Information Homepage*. Other Web sites to explore are the *Internet Road Map to Books*, *Bookzone*, the *ReadersNdex*, and the *Bibliophile Homepage*. Although each of these sites is unique, they all have a variety of book-related information. *Bookzone* has over one thousand links to other book-related sites and *ReadersNdex* is a more literary site.

For those interested in purchasing books, several sites for online book stores will fulfill their needs and book orders. *Amazon Books* lists over a million titles that are searchable by

author, title, and keyword. A personal notification service exists for the benefit of their customers, which e-mails a customer when a particular title, author or edition is available. *Book Stacks Unlimited*, with over 400,000 titles, advertises itself as your local bookstore wherever you live. If you are interested in what book stores are located in your neighborhood, check out the site of the American Booksellers Association, *Book Web*. This site allows you to search a listing of booksellers abroad and in the United States geographically or by specialty. Book store sites are not limited to title output from the United States. The *Internet Book Shop* has books from England. Other international book sites are for Canadian, Italian, French, Scottish, Japanese, and Chinese books. Most of the book stores previously mentioned include new and mostly in-print titles. If you are unable to locate a particular title, try the *OBS BookFinder Service* which connects you to the professionals that will make the best efforts to identify, locate, and order from publishers worldwide any current copyright in-print book in over 246 languages. Another service from *Thesis*, the *Times Higher Education Supplement Internet Services* is a book exchange which is free and easy to use.

For those interested in out-of-print or rare books, the Antiquarian Booksellers Association maintains a site with links to over 140 book stores that deal in rare or out-of-print books. The list of book dealers is searchable geographically or by specialty. Often only the address and telephone numbers are listed for individual book stores, but in some instances, the catalogs are available online, and arrangements can be made by e-mail to purchase specific titles. The *Virtual Bookshop* also specializes in rare, first editions, antiquarian, collectible and fine books. When it is difficult to locate a particular title, *Glyn's Books* will do an international book search for out-of-print titles, or e-mail your request to *ARC Booksearch* for a free search.

Another source of information about book titles, especially new or forthcoming titles, is available from the many publisher sites on the Web. Although a web site can be expensive and costly to establish and maintain, several hundred publishers have already created a presence on the Web. Lists and links to publishers' sites can be found at *AcqWeb* and the *WWW Virtual Library: Publishers*. Over 100,000 books published by University Presses can be searched by author, title, keyword, or Library of Congress subject heading at the *AAUP Online Catalog and Bookstore*. For those interested in instructional materials for higher education curriculum, *PubWeb* provides online information, and desk or review copies can be requested from participating publishers. Most publisher sites are valuable not only for current book title information, but have additional helpful resources. One example is *Penguin Books USA* a publisher site with resources for teachers and librarians with not only information about authors, but teaching and reader's guides for selected book titles. The Time-Warner site is an impressive example with a variety of useful and news orientated resources available online. What lies in the future for book publishing, especially on the Internet is an interesting subject. Will the cost of maintaining the web sites be worthwhile for publishers? Will they reach new markets? Some publishers have found already that offering an online version of a text has ironically resulted in more sales in the printed format

Bibliobytes is now publishing books in many genres electronically on the Web. With the rights to over 1000 titles, *Bibliobytes* can provide you with a copy on demand. Does this mean that someday no book will ever really be "out-of-print"?

Book related sites on the Internet provide us with not only information about book titles and editions, but even reviews about these books. The best place to begin a search for book

reviews is at *Bookwire's Index to Review Sources*. This site includes links to over eighty book reviewing sites in the United States, Canada, and abroad, including book reviews on almost any topic including computing, children's books, mysteries, etc. Readers contribute the reviews at some sites, but many sites include authoritative reviews such as the online reviews from *Atlantic Monthly*. Another site for book lovers is *Chapter One*, and as the title suggests, this site includes the table of contents and first chapters of books, including those reviewed in *Foreign Affairs* and other reviewing sources. So, not only can you read a review of a title, but also the first chapter.

Although reading an entire book online or printing it offline may not appeal to everyone, it is certainly possible at the many Internet sites with electronic texts. The best site for online texts may be the *OnLine Books Page* where you can search for texts by author or title, or jump to other sites using the extraordinary number of links to other electronic text sites. One of the largest and most well-known electronic text site is *Project Gutenberg* where you can find your favorite literary classic online. If you are really looking for true classics, the full text of Greek and Latin classics.

can be found at *Tech Classics Archive*. Another site that has to be mentioned, if only for its name, is *Project Bartleby* at Columbia University. Named after Melville's scrivener, it includes the full searchable text of reference titles. Two other sites are notable, the Library of Congress for its large number of links to electronic texts and the *Electronic Texts at the University of Virginia*.

If the above mentioned classics are not what you want to read, the Internet has a variety of genre related book sites for mystery, romance, fantasy, and science fiction readers. Mystery lovers can find a wealth of information at the *Mysterious Homepage*, or the *Tangled Web*, or

even the *ClueLass Home Page*. Anything related to crime or mystery fiction is linked to these home pages. Information on authors, chatting with fans or authors, new book titles, list of book stores, mystery magazines online, mystery games --all of this is available if you follow the smoking gun or the spider web icons. The genre of science fiction is well represented on the Internet. Visit *Speculative Fiction* for all kinds of information about science fiction, horror, and fantasy. *Science Fiction Resources* is another site with many useful links. For lovers of romance the *Romance Author's Page* will satisfy even the most jaded of romance readers with information about writers and publishers. Many authors also have an Internet site devoted to them and their work, so look up your favorite author on the Internet.

It has been predicted that in the future as more texts become available online and fewer books are printed, that the book will again become a valued object and an art form. Book arts exhibits are growing in number as are academic and professional programs devoted to the books arts such as binding, typography, paper-making, and printing. The *Book Arts* site at Syracuse University is the place to start investigating the wealth of information on this subject. The *University of Idaho Book Arts* also has links to artist's books and other book arts resources.

Almost any type of information relating to books is available on the Internet. In addition to the resources mentioned previously, many discussion groups and listservs are devoted to book related topics. If you can't find what you need, or are looking for a particular title, you can always check out library catalogs from all over the United States and abroad at *Hytelnet*. To start you on your search for book-related information on the Internet, the following selected book sites are listed with their current addresses. Links to all of the sites mentioned can be found at the following address: <http://www//mtsu.edu/~vvesper>.

Book Sites on the Web

General Sites

- BookWire** <http://www.bookwire.com>
- Internet Book Shop** <http://www.bookshop.co.uk>
- Internet Road Map** <http://www.bookinfo.com/welcome/roadmap>
- Bookzone** <http://ttx.com:80/bookzone>
- ReadersNdex** <http://www.readersndex.com>
- Internet Book Information Homepage** <http://sunsite.unc.edu/ibic/IBIC-homepage.html>

Academic Book Sites

- Academia** <http://www.baker-taylor.com/Academia/MO1/Home.html>
- AAUP Online** <http://aaup.princeton.edu>
- ACQWEB** <http://www.vanderbilt.edu/law/acqs/acqs.html>
- BookWeb** <http://www.ambook.org/bookweb>
- WWW Virtual Library: Publishers** <http://comlab.ox.ac.uk/archive/publisher.html>
- Penguin Books USA** <http://www.penguin.com/usa>
- Library of Congress Electronic Texts and Publishing Resources**
<http://www.loc.gov/global/etext/etext.html#authors>
- Pub Web** <http://www.pubweb.com/pubweb/home.html>
- Hytelnet** <http://library.usask.ca/hytelnet>

Book Reviews

Bookwire Index to Review Sources	http://www.bookwire.com
Boston Book Review	http://www.bookwire.com
Reviews of Computer books	http://www.bookwire.com
Quarterly Black Review of Books	http://www.bookwire.com
History Reviews Online	http://www.uc.edu/www/history/reviews.htmlx
Chapter One	http://www.psi.net/chapterone
Soundview Executive Book Summaries	http://www.summary.com

Rare and OP Books

Antiquarian Booksellers Association	http://www.abaa-booknet.com
OBS BookFinder Service	http://www.obs-us.com/obs/obshome.html
Virtual Bookshop	http://www.virtual.bookshop.com/htbin/catalog

Book Stores

Amazon Books	http://www.amazon.com
Book Stacks Unlimited	http://www.books.com

Texts Online

Online Book Page	http://www.cs.cum.edu/Web/books.html
Tech Classics Archive	http://the-tech.mit.edu:80/classics/
Electronic Texts at the University of Virginia	http://etext.lib.virginia.edu/uvaonline.html
Project Gutenberg	http://jg.cso.uiuc.edu/pg/lists/list.html
Project Bartelby	http://www.cc.columbia.edu/acis/bartleby

Online Magazines about Books

Salon <http://www.salon1999.com>

Against the Grain <http://www.spidergraphics.com/atg/atgld.html>

Book Page <http://www.bookpageweb.com>

Book Arts

Book Arts <http://web.syr.edu/~pdverhey/links.htm>

CONSTRUCTING EFFECTIVE SEARCH STRATEGIES FOR ELECTRONIC SEARCHING

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Electronic databases have grown tremendously in both numbers and popularity since their development during the 1960s. Access to electronic databases in academic libraries was originally offered primarily through mediated search services by trained librarians. However, the advent of CD-ROM and end-user interfaces for online databases has shifted the emphasis from mediated to end-user searching. Unfortunately, research studies have indicated that many end-users do not understand basic search concepts and, consequently, do not employ effective search strategies when using these databases. Learning basic database design and effective search strategies allows end-users to take the often neglected first steps to successful electronic searching.

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Electronic databases have grown tremendously in both numbers and popularity since their development during the 1960s. The January 1995 issue of the *Gale Directory of Databases* cites 8,776 individual databases as compared to just 301 in 1975 when this data was first recorded.¹ Access to electronic databases in academic libraries was originally offered primarily through mediated search services by trained librarians. However, the advent of CD-ROM and end-user interfaces for online databases has shifted the emphasis from mediated to end-user searching. Unfortunately, research studies indicate that many end-users do not understand basic search concepts and consequently, do not employ effective search strategies when using these databases. Learning basic database design and effective search strategies allows end-users to take the often neglected first steps to successful electronic searching.

DATABASES

History

Electronic databases were first developed in the mid to late 1960s largely through U.S. government sponsorship. The early commercial services included Lockheed's DIALOG Information Services, Inc. (1972), System Development Corporation's ORBIT (1972), and Bibliographic Retrieval Services, Inc. (1976). These services still exist today under new ownership and/or names. The early commercially offered databases were largely scientific and technical in content. Gradually, online vendors started offering end-user interfaces that allowed searching of a subset of their databases during evenings and weekends. The Knowledge Index (DIALOG) and BRS/After Dark (Bibliographic Retrieval Services, Inc.) both began operation in 1983. However, the real turning point in end-user access occurred with the explosion of CD-ROM databases around 1985-1986. As libraries offered the most heavily requested databases of their mediated search services on CD-ROM and other subscription based electronic formats the demand for mediated searching began to decrease significantly. At the Todd Library of Middle Tennessee State University the number of mediated searches reached a peak of 696 sessions during the 1988-89 fiscal year before the installation of our first CD-ROM products. Fiscal year 1994-1995 recorded just 48 mediated searches. There is little doubt that this trend will continue. The options for end user searching of online databases has also continued to grow. OCLC offered its FirstSearch service which currently provides inexpensive interactive access to over 50 databases in 1991. Many government and private databases are now also accessible and searchable over the internet.

Definitions

A database or file is a collection of records or data in machine readable form. The content of most databases represents either a specific subject or discipline or a type of document.² The information contained in a database is created by a database producer. Database producers include private or public companies, profit and nonprofit organizations or associations, or government agencies. For example, the American Psychological Association is the producer or publisher of the *PsycInfo* (online) and the *PsycLIT* (CD-ROM) databases. It also publishes *Psychological Abstracts* in print form. The database producer provides information in machine readable form to a database vendor who processes and distributes the enhanced product for a fee. Many databases are offered by more than one vendor. Databases from different producers made accessible from the same vendor have the advantage of being searchable using the same interface or search commands. Many database producers have also adopted the role of database vendor by making their databases available directly.

Types

Databases are usually classified according to type. The *Gale Directory of Databases* currently divides databases into four basic classes; word-oriented, number-oriented, image-oriented (video and still), and sound oriented (audio).³ The largest number of databases fall into the word-oriented class which includes bibliographic, patent/trademark, full-text, directory, and dictionary subclasses.⁴ The most common word-oriented databases are full-text and bibliographic.⁵ Bibliographic databases contain references to the original source material. A complete bibliographic citation including the author, title, source, subject headings and often an abstract is retrieved. The ERIC database is an example of a bibliographical database. A full-text database contains the complete text of an article or document.

Structure

Databases consist of records. There is one record for each unique item contained in the database. Additionally, each record or individual item will contain multiple fields or lines of specific information.

DATABASE SELECTION

Before selecting an appropriate database the research topic must first be clearly defined. Once the topic has been decided it is also important to consider the currency, comprehensiveness, types, location, and completeness of materials needed.

Currency

Currency is usually more important for scientific, technical, and business searches. For these searches it will be important to know how frequently the electronic database is updated. Libraries faced with financial constraints often opt for less expensive quarterly updated subscriptions making them less current than online and often print equivalents.

Comprehensiveness

Comprehensiveness will be more significant to a student researching a master's thesis than to an undergraduate assigned a five page research paper. The graduate student will likely need to search several subject specific and related databases. In contrast, the undergraduate will usually be pleased with the results from a general academic periodical database that indexes a small number of top titles in multiple subject areas. It is important for end-users to be aware that most electronic databases do not provide coverage before the mid 1960s. Databases in the humanities and social sciences frequently do not go back further than the early 1970s. However, coverage provided by the academic library's online catalog is usually an exception. Most provide electronic access to all library material records regardless of publication date.

Types

End-users must determine what types of material are included in the database they select. Do they want to search for books, journal articles, videotapes, government documents, financial information, or a mix of material formats? The type of material desired can be a factor not only in choosing the specific database, but also in selecting specific files within the database. For example, the *PsycLit* database provides access on separate disks or files to current and retrospective journal articles and to chapters in books related to psychology.

Location

Although not unique to electronic resources, location of materials may also be a factor. A search of the academic library's online catalog will pinpoint materials owned by and located at the university. In contrast, a search of the *PsycLit* database will retrieve citations to many specialized domestic and international sources that the patron may need to request on interlibrary loan. This service may not be open to undergraduates at all institutions.

Completeness: Bibliographic or Full-text?

Finally, it is important to ascertain if the information that will be accessed in the database is self-contained such as a directory entry or a full-text article or if it is a citation to the source material that will require another step to obtain the material.

PLANNING THE STRATEGY

Search Term Selection

After selecting the most suitable database the research statement must be broken down into its component parts by identifying the main keywords or concepts. The search topic how **self-esteem** relates to the **academic achievement of third graders** can be separated into three distinct concepts. The next step involves selecting the appropriate terminology for searching these concepts.

Controlled Vocabularies: Many specialized databases have their own set of subject headings which reflect the subject matter of the discipline. For example, the MESH headings are used in many medical journal databases, special topics relating to education are listed in the *Thesaurus of ERIC Descriptors*, the Library of Congress subject headings are used in many online catalogs of books, etc. Databases with controlled subject vocabularies searchable through a thesaurus help take the guesswork out of selecting the appropriate subject headings. Most online thesaurus displays provide information about when the term was first introduced, provide a definition, and list related, broader, and narrower terms that may also be selected. It can likewise be helpful to check the database index which typically lists all terms included in the database with their frequency count. A search of the online *ERIC* thesaurus reveals that academic achievement, grade 3 and self-esteem are all valid descriptors which match the three main concepts of our search topic. However, end-users should note that if descriptors are selected through the thesaurus the search will be limited to the descriptor field of the record rather than searched throughout. Unfortunately, research studies conducted by Barbuto and Cevallos (1991) and Charles and Clark (1990) have indicated that end-users experience much difficulty with search term selection.⁶

Free-text Search: If a concept is not listed in a database's thesaurus the user should perform a free-text search where the keyword is entered and searched in all parts of the record.

Combining Terms

The Next step involves planning how the terms should be combined to retrieve relevant results. By separating our concepts into three separate search sets the boolean operators **and**, **or**, and **not** can be used to obtain tailored combinations. To obtain records containing all three search concepts the terms should be combined using the boolean operator **and**.

The Boolean operator **or** is used to create sets of related concepts. **Not** is used to eliminate a concept from consideration.

Common search strategies include beginning with the most specific subject headings and

expanding using the boolean operator **or**; beginning with the broadest subject headings and narrowing down as long as possible using the boolean operator **and**; and beginning with a known relevant citation or author and searching for others like it after examining the listed subject headings. A sample *ERIC* search on CD-ROM illustrating use of the boolean operators **and** and **or** to narrow and expand a search is illustrated below:

**SAMPLE ERIC on CD-ROM SEARCH
ERIC 1992-12/95**

No.	Records	Request
#1	5326	ACADEMIC-ACHIEVEMENT in DE
#2	463	GRADE-3 in DE
#3	1426	SELF-ESTEEM in DE
#5	6	#1 and #2 and #3
#6	2458	PRIMARY-EDUCATION in DE
#7	2673	#2 or #6
#8	14	#1 and #3 and #7

REFINING YOUR SEARCH

If your initial search produces irrelevant references or more references than you need for the purpose of your research, you may wish to refine or fine-tune the results. However, it may be better to retrieve some false drops than to attempt to construct a very elaborate strategy to eliminate them and risk also eliminating useful information. The number of records may be reduced or expanded by using several techniques.

Narrowing Results

Subject searching: By limiting your search to the controlled vocabulary of subject headings you may retrieve more relevant records.

Beginning with a free-text search on a specific term(s) and then filtering the results through a general subject category to insure that the references deal with your broad topic may be the most productive search strategy. An example might be a key word search on "blimps" followed by a subject term search on World War I.

A technique for fine-tuning results suggested by Snow is to limit important concept keywords to major emphasis if this is available in the database.⁷ This is usually applicable only in databases with a controlled vocabulary of descriptors, as in ERIC. Similar results may be achieved in more natural language indexing by requiring that concept keywords appear in the title, descriptors, or identifiers. Although this is a somewhat arbitrary approach, it may tip the scales toward precision at the expense of recall.

Searching Author and Title Fields: If you know an author or a title or part of a title, you may limit the search to the author or title field for quickly retrieving specific references.

Limiting using specialized fields: Many databases have specialized fields which are relevant to the subject covered. You should become familiar with the particular fields provided in the database(s) you use. For example, an index to business information may have a field for SIC codes, for company names, or for geographic areas. Online library catalogs may have a field for the format of the item; that is, book, serial, videorecording, etc. ERIC assigns a grade level(s) such as primary-education and a document type such as research reports, guides, and conference proceedings to each item. Often searching in a specific field can narrow the number of hits significantly and may prove valuable in fine-tuning results to your needs. Consider carefully what you are eliminating, however, for you may miss items containing excellent information. By choosing only book format you will eliminate all microtext, or by choosing only research reports you eliminate all conference proceedings, etc.

Limiting by date: Most databases allow for limiting results by publication date. This is often the quickest way to eliminate a large number of hits so it is very tempting to many users. Conkling and Osif point out that literature does not become obsolete as quickly as may have been assumed, and there are dangers in not studying older literature, even in scientific databases.⁸

Using the Boolean operator and: The relevance of search results can often be increased by using the operator **and** to connect two key ideas in your search. This insures that BOTH ideas are included in the reference. For example, a search on "Parkinson's Disease" with the term "treatment" connected with the operator "and" added.

Using the Boolean operator not: If your search results contains many hits which are not relevant and which contain a common term, use of the **not** operator will eliminate items with the term in them. This strategy should be used very carefully, however, for you may eliminate items which would be useful.

Example: A search of an online library catalog for the subject terms "science periodicals" will retrieve not only the scientific periodicals but also those dealing with social science, information science, etc. Therefore, a search in the subject headings field for "science periodicals not social information" may obtain more precise results.

Use Proximity operators: Many databases provide a means for stipulating that words in a search query have a certain positional relationship to each other. The exact method of entering the criteria may differ from database to database, but generally the following requirements can be accomplished.

The words must be in the same field.

The words must be in the same sentence.

One word must precede the second by n number of words.

One word must be within n number of words of the second.

Relevance-ranking: Snow explains the relevance-ranking technique which is becoming available on more and more databases.⁹ Three factors are applied which contribute to the "weight" of each item. The factors are: (a)Quorum - the number of query terms found in the record; (b)Proximity - Closeness of query terms to each other and other occurrences of themselves; and (c)Frequency - statistical weighing of query term frequency in the record versus the database. Relevancy-ranking allows the computer to decide which items will more nearly fit the search criteria and return the most likely ones at the top of the list. A long list of hits can be shortened by choosing to download or print only the top portion of the list.

Expanding Results

If the results of your initial search does not yield enough appropriate references or if the purpose of your research requires that you do an exhaustive literature search, then you may need to expand your search results. There are several possible ways of expanding results.

Use truncation: Some databases will automatically search for a simple plural form of a word and some will do automatic truncation in certain fields but not others. The symbol for truncation and the number of characters which are replaced will vary from database to database. You have to know the way the specific database you are using operates. Often the plural form of nouns is used in controlled vocabulary subject headings. Example: entering "librar*" retrieves "librarian," "librarians," "librarianship," "libraries," and "library."

Use the Boolean operator or: The Boolean operator or is used to link synonymous ideas. These may be expressed as keywords, phrases, codes, or the results of a previous search. Use of the "or" will serve the dual purpose of collecting additional relevant items and eliminating duplicate hits. If you receive few or no hits on a topic when you expected to find several, then try as many synonyms as possible. Lancaster et.al. in a 1994 study on end-used searching of CD-ROM databases reports that the greatest problem faced by library patrons is being able to identify and use all of the terms needed to perform a complete search.¹⁰ Many terms may need to be used to obtain complete coverage of an idea.

Do a free text search. Although a free text search may retrieve irrelevant items, it will serve the purpose of retrieving any possible reference to your term(s). In addition, it allows for the use of more natural language than the controlled vocabulary of a subject search. Often a free text search can be used to retrieve some items and then an appropriate subject heading can be identified which may be used to retrieve more relevant results.

Use the pearl-gathering technique: Pearl-gathering is a term used to refer to the technique of studying a relevant citation and identifying additional terms to be used in your search query. Additional words, subject headings, or specific fields may be identified. A particular author may appear as an expert on your topic, suggesting a search by author.

Substitute a general term(s) for specific ones. Use a more general term(s) with the expectation that an item dealing with the general topic may include at least some information on the more specific topic you need. This is an especially useful strategy when a search for a very specific topic has returned few or no hits, or when searching for books in an online catalog where individual chapters are not indexed.

Remove some of the limiters or operators. If the boolean operators "and" and "not" have been used in your search or if a limitation by date, publication type, etc. have been applied, you may have eliminated too many hits. By removing these limiters, your results will be expanded.

Problem Solving Techniques

In an article in Online Ojala humorously reminds us that Murphy's Law is alive and well and lurking in a database search near you.¹¹ She admits that when she sits down to enter a search, it often seems that she becomes dyslexic, transposing letters or numbers, entering the wrong set number, or making typing errors. Any of these things could dramatically change your results.

If you are not getting the results you expect in your search, there are several techniques which may be helpful in solving the problem.

Be sure you are using an appropriate database: The first thing you need to check is to determine if you are using an appropriate database for your topic and purposes. You will not be able to locate periodical articles in a library's online catalog, and you will not be able to locate book authors/titles in a periodical index. In addition, you will not find technical scientific information in a business index, nor business information in a nursing database. Although you may retrieve a few hits while using an inappropriate database, most likely they will not be the BEST references and certainly they will not provide a complete listing of references on your topic.

Check also the time period covered and the update frequency of the database in relation to your topic. If an event happened one month ago and the database was updated three months ago, you need another source. Or if a scientific discovery was made twenty-five years ago, and the database covers only the last ten years, you will miss the most important coverage of the topic.

Check spelling: Although this may seem like an obvious error, it is often an overlooked one. Typing errors are easy to make. British spellings are often different from American spellings. Spaces, apostrophes, hyphens, slash marks, diacritical markings, etc. may make a vast difference in the way a computer searches. A computer matches your entry against what it has stored in its file on a character-by-character basis, space for space, symbol for symbol. If you enter a journal title as "Art News" when it should be "ARTnews" or "Data Base" when it should be "Database," the computer does not guess what is wanted. Some systems will ignore case of letters and punctuation, but you should know the system to be certain. And do not expect every database to use the same form of a word. Both "Parkinson's Disease" and "Parkinson Disease" are used in subject headings (controlled vocabulary) in various databases.

Terminology may change over time. Some databases have the terms African Americans, Afro-Americans, Blacks, and Negroes all still on some records, depending on what was considered correct at the time the record was entered. Educators no longer refer to "mainstreaming" but now use "full inclusion." Use of a thesaurus with scope notes can help a searcher find all the terms applied to a concept.

Be sure you browse the index or other listing of entries to check the name of a person or company. If the index uses the full first name of a person and you use the initials, you may not retrieve all the needed records. Be especially wary of names containing acronyms. For example, American Telephone and Telegraph may be spelled out, but it may be listed under AT&T, A.T. & T., A.T. and T., or other variants. The official names of companies may contain the word Inc., Co., or spell out the word "company", etc.

Names or phrases with stop or noise words within them are also tricky. How does one search for "Bank of America" or "stream of consciousness"? This may be easy if the database allows bound phrase searching. Otherwise you may have to use proximity operators (bank w/1 america). You must know how the particular database you are using handles such stop words to be successful.

Another problem related to spelling is entering an incorrect code number. If the digits in a SIC code are reversed, for example, your results will not be at all what you expect.

Reconsider any truncation: Truncation of a term may allow for inclusion of some words you did not consider. For example, an entry for polic# (in search of policy or policies) will also retrieve police.

Reconsider search strategy: Look carefully at the search you entered. If it is a complex strategy using several logical operators or reusing search results sets, it is easy to make a mistake in entering it. If a searcher wants to combine concept A and (B or C or D), but types in A and B or C or D, the system will most likely perform the search as (A and B) or C or D. A wrong set number may be used; a "not" operator may be eliminating useful items; incorrect use of nested parentheses may be changing the results.

Maybe it is not your error: Remember that the database itself may contain errors and omissions. Many producers are now using scanners to input full text which causes some errors to occur. PAIS is spelled PALS in a recent full-text article. Data entry personnel often make typing errors or omit a field altogether. You may miss a useful record if you are searching for all companies with a specific SIC code or a specific publication date and no information is entered in the field.

Most databases have a limit to the number of words and the number of characters in each word which the computer actually checks in response to each query. The PALS OPAC system uses only the first four words of a term, title, or subject search. If you enter the title "Journal of the American Medical Association" in the catalog at Todd Library, you get over fifty hits because the search stops after the word "American" and retrieves all matches to that point. A title term search using only the four most important words in the title would be more exact. OCLC also uses only four title words and uses the search pattern 3,2,2,1. That is, it uses only three letters of the first word, two letters of the second and third words, and the first letter of the fourth word. PALS uses an 8,6,6,4 search pattern. There is also a limit to the number of letters checked in author names, etc. If you obtain strange results, this method of computer operation may be the cause.

Try several strategies: If the purpose of your research requires an exhaustive literature search, then you need to try several different strategies and even several different databases, if possible, and compare the results.

EVALUATION OF RESULTS

It is easy to be so dazzled by the technology of online searching that you accept whatever results you get on the first try as the best information available. However, you should scan the references immediately, noting the words and phrases which are relevant to your needs, and asking questions similar to the following:

- Are my hits appropriate for my purposes?
- Are they from popular, trade, or professional sources?
- Are they from known authors in the field?
- Are they what I expected?

If you are not satisfied with the results, then do some creative thinking about your search query and try again!

CONCLUSION

The advent of end-user electronic databases is an exciting development for both patrons and librarians. There is little doubt that these resources are a popular and glamorous addition to the information arsenal. However, too often end-users are misinformed about what they are searching, how it is organized, how it should be searched. Without acquiring what Loomis and Fink refer to as a "cognitive gateway with which to approach any access source," obtaining relevant search results will remain a haphazard proposition at best.¹² End-users must realize that it is essential to obtain instruction in the design and use of these powerful products in order to reap their full benefit. At the same time librarians must encourage users to be realistic about the capabilities and limitations of these products.

1. Martha E. Williams, Industry Analysis in Gale Directory of Databases. Volume 1, Online Databases by Kathleen Lopez Nolan, ed. (Detroit, Michigan: Gale Research Inc., 1995), xix.

2. Searching DIALOG: The Complete Guide (Dialog Information Services, Inc., 1989), 3-1.

3. (Williams, 1995, xxi)

4. Ibid., xxiii.

5. Ibid.

6. See Domenica M. Barbuto and Elena E. Cevallos, "End-User Searching: Program Review and Future Prospects," RQ 31 (Winter 1991): 223; Susan K. Charles and Katharine E. Clark, "Enhancing CD-ROM searches with Online Updates: An Examination of End-User Needs, Strategies, and Problems," College and Research Libraries 51 (July 1990): 327.

7. Bonnie Snow, "TARGET for the Biomedical Searcher," Online 18 (Nov-Dec 1994): 58-63.

8. Thomas W. Conkling and Bonnie Anne Osif, "CD-ROM and Changing Research Patterns," Online 18 (May 1994): 71-74.

9. (Snow, 1994, 58-63)

10. F. W. Lancaster, Cheryl Elzy, Mary Jo Jeter, Laura Metzler, and Yuen-Man Low, "Searching Databases on CD-ROM: Comparison of the Results of End-User Searching with Results from Two Modes of Searching by Skilled Intermediaries," RQ 33 (Spring 1994): 379.

11. MaryDee Ojala, "Troubleshooting Your Search: Whatever Can Go Wrong, Will Go Wrong," Online 19 (Nov-Dec 1995): 59-61.

12. Abigail Loomis and Deborah Fink, "Instruction: Gateway to the Virtual Library," chap. in The Virtual Library: Visions and Realities, ed. Laverna M. Saunders (Westport, Connecticut: Meckler Publishing, 1993), 49.

The Electronic Journal on the Internet

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Abstract:

The rise in popularity of the Internet has had an enormous impact on scholarly communication, especially with the development of the electronic journal. There are a number of advantages to reading and publishing scholarly articles in electronic form, but there are some problems that have yet to be solved before electronic publication becomes widespread. Some organizations and publishers are trying to find a compromise between traditional print journals and their electronic counterparts. There will likely be a lengthy period of transition as academics begin to see the advantages of retrieving their research via the Internet.

Scholars have always valued the importance of communication with their peers, both through formal means, such as the academic journal, and informally, through what is commonly known as the "invisible college." Both types of interaction are important to the free exchange of ideas. In the last few years, the rise in popularity of the Internet has brought about a new era in scholarly communication. Academics and researchers are finding that they may communicate with one another faster and more easily than ever before.

Online academic discussion groups have existed for several years now, both through Usenet news groups as well as listserv and other electronic mail distribution programs. Electronic mail, which is probably the most popular use of the Internet, allows scholars to communicate with colleagues throughout the world more inexpensively than by phone, and faster than traditional mail. And many academics routinely use Internet sources such as Gopher or the World Wide Web to track down information in their field, or to make their research findings available to others.

It is only natural then, that more formal scholarly communication should follow in the path of these informal academic discussions. The development of the scholarly electronic journal illustrates the impact that the Internet is having on traditional academia, as more refereed journals make their debut online.

Electronic journals have been defined as "any serials produced, published, and distributed nationally and internationally via electronic networks such as Bitnet and the Internet."¹ The 1996 edition of Ulrich's International Periodicals Directory lists several thousand serials available online, many of which are refereed.

Electronic journals can take many forms, from the "true" electronic journal, which is only available through an electronic medium, to print journals which are merely paralleled by electronic counterparts. Some are subscription-based, and some are available at no charge over the Internet. Electronic journals are also distributed in many different ways. Some send a table of contents for each issue by email with instruction for the retrieval of the articles, other journals send the entire issue immediately. Many are available on the World Wide Web which allows hypertext links between articles and citations, and even sound and video. However, all of the true scholarly electronic journals have the same rigorous acceptance standards as print journals, and contain the full-text of the articles, not just a table of contents and summary information.

The World Wide Web has quickly taken over as the preferred method for accessing electronic journals on the Internet. There are a number of reasons for this. First, it is a simple interface with easy-to-read typefaces. Authors can use devices such as bold, italic, and graphics such as photographs or charts to enhance their work, unlike the plain ASCII text found in other interfaces such as Gopher or ftp. The point-and-click hypertext links make it easy for even inexperienced computer or Internet users to travel from document to document, following a thread of information.

It is also easier to publish on the Web. In very little time one can master the technology of producing a Web page and making it available to the masses. Universities usually offer scholars direct access to the Internet, and may allow Internet users to view research and scholarship directly from the academic institution. An example of this is Project Muse from Johns Hopkins University Press, which offers some of its journals online on an experimental basis. Projects such as this may begin to blur the line between formal scholarly publishing and the "invisible college" of informal scholarly interaction.²

The growth of electronic journals has been fueled by increased and more broadly available technical capabilities and the relatively low cost of electronic distribution, in addition to the downsizing of U.S. university budgets and flattening of growth of academic library budgets. The costs of subscribing to traditional scholarly journals has been rising much faster than the rate of inflation, with the largest price increases coming from private, for-profit European scientific publishing houses.³ Electronic journals may not always necessarily be cheaper to produce than paper, but do offer more options and ways to recover costs. Readers may only have to pay for the actual articles retrieved, rather than for the entire issue. Some of the costs may also be shared with other groups, lowering the per-use costs.⁴

Electronic journals have a number of other benefits over traditional publishing as well. Economic factors such as printing and mailing costs tend to limit the size of print journals. This results in a lower acceptance rate of submitted articles. It is also not uncommon for a year or more delay between the time of submission of a paper to a journal, and when it is actually published. It then takes many more months or years for readers to react and respond to the author's research. Electronic journals, on the other hand, allow for a much faster peer review and publication process and a higher acceptance of articles by editors. The review process is often faster because articles are submitted in electronic format by the authors, and there is no lengthy print publication schedule to follow. And because of the interactive nature of the Internet, feedback from scholarly peers is usually immediate. Often, sending a letter to the author is as simple as clicking on the person's name and sending an electronic mail message.

Another benefit of the electronic format is the ability to make primary materials more accessible to a broader audience, and to allow the reader to add to current knowledge available electronically without disturbing the original research. Projects may be linked to related research, and knowledge may be added continually long after the original researcher has finished. An example is the Civil War archive at the Institute for Advanced Technology in the Humanities. Ed Ayers, the director of the project, accepts (after careful screening and editing) contributions to the project from the public's own personal records and memorabilia.⁵

For authors, electronic journals combine the qualities of print and computerized formats because articles may be read and manipulated on screen, or they may be printed out. In electronic form, they may be rapidly searched for keywords, and may be easily

changed. Drafts may also be printed out in order to make short marginal comments, and to make them more portable.

For library users, a distinct advantage of an electronic journal is that it is never missing from the the shelf or at the bindery, and several people can read the same article at once from separate work stations. Often readers need not even have to come to the library at all, but can access the subscription from their home or office comuter. As many scholars are using computers more and more for research and word processing, they may find it more convenient to use the same terminal to refer to journal articles as well. And as more journal indexes become available online, professors and students alike will be able to perform searches on their topic, locate the article, and print it out all from a remote computer.

Unlike most print publications, the electronic versions are usually self-indexing. They are also searchable, and have the ability to link correspondence and corrections with the original article. They can link citations to an abstract or even the full-text of the cited article, so that readers may easily skip from one related article to another. In addition, electronic journals have the ability to offer bulletin boards and other special-interest forums monitored by the journal's editorial board, formulas and diagrams which may be manipulated by the viewer, and multi-media such as sound and video.⁶

Another benefit is customization: only desired articles need be downloaded and read, and the reader can control how the articles look. Electronic journals definitely use less paper, making them easier to manage along with being environmentally sound. And even though portability is usually cited as one of paper journals' strengths, electronic data actually takes up less room. One computer diskette can hold many articles, and CD-ROM disks many more. Thus, archival copies can be stored much more compactly than shelves of bound journals, a definite advantage for libraries with space limitations.⁷ And with the advent of the laptop computer, a user could theoretically carry the equivalent of several bound journals in the space of a lightweight notebook computer.

So with all these clear benefits, why haven't electronic journals completely taken over print already? Despite their many advantages, there are still some problems with electronic publishing yet to be worked out. According to Collins and Berge, there are three major functions of paper journals that must be transfered to electronic versions before they can become widely used and accepted. These are credibility, accessibility, and permanence.⁸

The credibility of electronic journals is often questioned in reference to the following issues: "e-journals do not carry the same weight as print journals in academic credit and advancement decisions, ejournals are neither accepted nor supported by universities because e-journal publishing efforts may not be recognized as an official university activity, and the peer interest that generates the authorship and readership of print journals may not exist."⁹ The biggest obstacle seems to be the reluctance of tenure

committees to accept publication in an electronic journal, and to give that publication the same weight as a print journal.

This lack of status of electronic journals continues to be a major hindrance to authors who wish to publish in this medium. Most researchers will not publish in electronic journals unless they are rewarded with the same benefits they can expect to receive from publication in a traditional print journal. These benefits include credit for tenure decisions, citations in other scholars' research, invitations to lecture, awards, assignments to editorial positions and more.¹⁰

The debate about scholarly electronic journals seems to be centered around the distribution, or medium, of the journal rather than the production. Scholars critical of electronic publishing see it as deficient in some key ways as opposed to print alternatives. However, computers have been used in the production of scholarly print journals for some time now, and authors often submit their papers in the form of a computer disk, or even online. It is the electronic distribution of that same material that is the distinguishing characteristic of electronic journals, and the one that is most debated by scholars and publishers.¹¹ And even though electronic journals may accept more articles because of lower publication costs, that higher acceptance rate may also contribute to its lack of credibility.

The insecurity of authors regarding the acceptability of electronic publishing among tenure committees was echoed in the words of the editor of *The Online Journal of Knowledge Synthesis for Nursing* after the decision of the Institute for Scientific Information to index the journal: "The decision will enable contributors to this journal, and to other electronic journals that ISI accepts for inclusion in its products, to assure their tenure committees that electronically published materials are valid for consideration."¹² This illustrates the awareness the electronic journal publishing community has of the problem, and their desire to create that aura of credibility that traditional journals have enjoyed for so long. To do this, online journals must maintain the rigorous standards that print journals have employed.

In her study on the electronic journal as a viable channel for formal scholarly communication, Karen Butler defined "acceptable" scholarly criteria for journal publication to include being peer reviewed; accessible through indexing and abstracting services and citations in other publications; retrievable by the scholarly community; known and respected by the scholarly community through strict review policies; well-respected editorial board members; sponsored by a well-respected institution; receiving good publication reviews; quick publication of submitted material so that authors may establish priority claims to new knowledge; contribution to further scholarly dialogue (feedback and commentary to authors); and serving as an exclusive channel for initial dissemination.¹³ Many of these criteria are already being met, including having respected editorial board members and sponsoring institutions, and quick publication. Others may take more time such as being cited in other publications, indexing and abstracting, and being easily retrievable by the scholarly community.

These last problems bring up the next obstacle which must be overcome by electronic journals: accessibility. Few electronic journals are indexed in common indexing services. This lack of indexing is the reason many scholars are not even aware that an electronic journal in their field exists. Even if the existence is known, one does not always know where to find it; and once found, it is sometimes difficult, especially for computer novices, to determine the contents of back issues and how to access current or future issues.¹⁴

If electronic journals are not read as widely as print, then they are much less likely to be cited in other works. And if they are not cited, fewer people will know about them. It is this vicious cycle that is working against the quick acceptance of many online publications. One reason some are reluctant to cite electronic information is the confusing transition from paper to computer screen. Page numbers do not always match screen or page breaks, proving to be meaningless except to keep copies in order. However, some form of page numbers will probably continue to be used in order to maintain a standard method of citation.

Electronic publishers are also working against the resistance by some scholars to the conversion to computer technology. While there are still people who are reluctant to use technology to access information, electronic journals will not be easily accessible to everyone. And in all fairness, many online publications do suffer from frustrating interfaces, slow network speeds, and confusing hardware and software requirements. A researcher may discover an online journal in his or her field, but then find that the software or type of connection needed to view it is not available. As technology develops, and standards are created, this may become less of a problem.

Finally, there is the problem of permanence. Authors want to know that years from now their work will still be available to other researchers, and scholars in the field want to know that the text they are reading is an authoritative version with a definitive date of creation. The lack of physical permanence of electronic publications leads to worries about how available they will be in future years, and whether they can be adapted to new technology. Will they become obsolete as technology changes, and lost to the reading public forever? Authors may also worry about corrupted copies of their articles being stored on other computers after being distributed electronically, even if a definitive copy is archived at a specific site. With print journals, this is usually not a problem because it is much harder to alter a hard copy.

Many wonder who will take over the job of archiving electronic journals. So far, most electronic journal publishers offer access to back copies at their Web site, or by electronic mail or ftp. With print journals, this archiving function is not provided by the publisher, but by libraries which subscribe to the journal and maintain its archives. Will libraries also keep copies of electronic journals? And will these copies exist on a floppy diskette, CD-ROM, or some other format? Another question is if there will also be definitive print versions available, especially for electronic journals with no print

equivalent. Many readers still have computer screens with very low resolution, and they may not be able to view photographs or charts and graphs very well. Will they be able to order a print copy from the publisher instead?

There are some organizations that are seeking to find answers to these questions, and to help electronic journals gain the credibility that print journals enjoy. The Triangle Research Libraries Network (TRLN) in North Carolina has been working on a project to develop strategies for cooperative resources development in the sciences and engineering. A major part of the project is the use of an electronic medium of scholarly publishing in order to combat the rising serials prices, and the opposing forces of for-profit print publishing and not-for-profit research. They defined the fundamental goals of scholarly communication as:

1. To ensure that the worldwide community of researchers has rapid, convenient access at reasonable cost to the validated results of all relevant research.
2. To assure researchers and students seeking information about research results in any discipline that the results "published" have been carefully reviewed by peer experts to meet high research quality standards and then carefully edited for clear and accurate presentation.
3. To ensure that future generations of researchers will have undistorted, convenient access at reasonable cost to the results of important research conducted today and in the past.¹⁵

They feel that the "ideal scholarly communication system of the future" will have certain characteristics that are already being put in place today. In this ideal world, the preferred means of scholarly publication will be the publicly supported portion of the worldwide Internet. Research libraries would remain the primary access points and archival repositories for both printed and electronically published research.

The current system of primarily for-profit scholarly publication would be supplemented by a new system in which some electronic publishers would be licensed by individual researchers, university presses, and scholarly associations to publish special compilations, indexes, or other value-added products for sale where potentially profitable markets exist. And the technical systems and policies needed to support this new scholarly communication system would grow out of consensus and collaboration among research libraries, universities, university presses, and associations of researchers in all disciplines.¹⁶

However, none of this will be accomplished until the practice of publishing in peer-reviewed journals available over the Internet becomes more accepted by academic institutions and professional associations. TRLN feels that eventually, in the sciences and technology anyway, that electronic journals with worldwide access will replace

traditional print-on-paper journals, especially if this provides low-cost access for scholarly communication purposes.¹⁷

Another organization that is addressing these concerns is the Online Computer Library Center, or OCLC, with its Electronic Journals Online (EJO) program. OCLC has promoted electronic publishing of journals for years, beginning with the publication of *The Online Journal of Current Clinical Trials* in July 1992. That made OCLC and the American Association for the Advancement of Science the first to publish a scholarly, peer-reviewed journal electronically. The journal has done so well, that it is now being indexed in the MEDLINE database, one of the few to reach this level of acceptance.¹⁸

OCLC acts as the "publisher," while its partners carry out the editorial and marketing functions of the journal. As soon as the authors have passed the peer-review process, the editors send OCLC the articles, along with any graphs, charts, or equations to OCLC in Standard Generalized Markup Language (SGML). The articles are then made available online within twenty-four hours.¹⁹

OCLC has also introduced Guidon software for viewing electronic journals. It allow users to choose between dial-up access or viewing through the World Wide Web, most often the preferable way to browse online. The Web allows readers to jump from text to a cited reference through hypertext links, or to view graphics. In addition, readers can link to the citation database in their field. For instance, in *Current Clinical Trials*, references are linked to MEDLINE citations and abstracts. Guidon also allows readers to link to a FirstSearch database directly from the journal, or to click an icon and send the publisher a letter in response to an article or a rebuttal to a previous letter.

Another note-worthy example of an electronic journal is the *Journal of Artificial Intelligence Research (JAIR)*. Its publishers have addressed the credibility problem of electronic journals by doing their best to make their journal as much like a print publication as possible. Its pages are formatted to appear like a print journal, and it can also be bought in paper format. When an article in the electronic version of *JAIR* is printed, it looks just like a photocopied journal page, with headers, footers and specific page numbers for each article as they appear in the print version. The editors of *JAIR* encourage readers to cite articles in their journal as they would a paper article, and do not encourage the inclusion of URLs (Uniform Resource Locators, or Web addresses) in that citation. This gives authors and readers the convenience of electronic publishing, while appearing traditional to those who would discount out-of-hand an entirely electronic journal.²⁰

It is probable that this sort of compromise between print and electronic will continue with many electronic journals until they become more accepted for their content rather than their format. Eventually the print model will no longer be used to limit the electronic model, which will provide the ability to access and use information in ways which have not yet been discovered or imagined. So far however, in this infancy of electronic publishing, few electronic journals take advantage of the capabilities of

publishing in this medium. Most articles could be found in print journals in basically the same form. An exception to this is the aforementioned *Journal of Current Clinical Trials* which creates hypertext links between related articles and letters to the editor related to specific articles. We will probably soon see more interactive features such as executable algorithms and data sets, and audio and video.²¹

The change from print to electronic is inevitable, and is already becoming evident. Many print publishers already offer table-of-contents or current-awareness services online. Many online indexes already offer the full text of articles to be viewed, so researchers are getting used to retrieving journal articles in unconventional ways. Commercial publishers are also beginning to experiment with allowing the full text of print journals to be licensed for electronic access. An example of this is Elsevier's *The University Licensing Project*, or TULIP.

TULIP lasted from early 1991 to the end of 1995. The goal of the project was to test systems for the networked delivery of journal articles directly to the user's desktop. For 83 of their materials science and engineering journals, Elsevier produced cover-to-cover bitmap images of each issue, and unedited ASCII full text of each article. They were delivered electronically to nine U.S. universities that participated in the project, and each university then developed its own front-end search and display system for its users. The focus of the research was to test the technical issues involved, study user behavior, and answer organizational and economic questions.

Their research found that the concept of desktop access to full text/image articles underlying the TULIP project was very well received by the end users who required a system that was fast and easy to search, read and print. However, the hardware and software requirements were serious obstacles for convenient use of the TULIP data at most sites.

In the final report of the TULIP project, it was found that there were four major factors which determine how successful projects like TULIP will be. First, there must be dedicated project management and cooperation among all the parties involved in having the right sources available at the right time. Second, institutions must have an understanding of their user community's needs before they begin offering such a service. Third, there must be an adequate infrastructure in place including systems and systems development, networking and printing, the ability of the campus network to handle graphical data, and user desktop systems. Finally, the service must be heavily promoted. At the sites in TULIP that did extensive promotion, the use of the system was increased significantly.²²

The data from the TULIP project will no doubt be used by other publishers when deciding about offering their print journals electronically. The transition may take longer than many expected however, because the transition to electronic publishing holds many implications for publishers, including the registration of the proprietary date of an article, and the conditions governing access to and copying of published articles.²³ Many paper-

based publishers are also worried that unlimited on-line access to journal articles will cut into their subscription base. Some have proposed a pay-per-use model for electronic access, but that may not go over well with academics used to unlimited access to journals to which they or their universities subscribe.²⁴ Some are worried that costs may actually rise with electronic journals, if publishers start monitoring who is reading their articles and when, and charging accordingly.

It is difficult to guess what the future holds for scholarly publication. Metz states, "... we should not expect to predict the characteristics of an electronic future for scientific and scholarly communication by extrapolating from today's experiences."²⁵ Clifford Lynch of the Office of Technology Assessment has proposed some future scenarios for the electronic environment. Among other things, he believes that electronic libraries will slowly evolve incrementally out of existing library systems, and that for several more decades, there will be both print and electronic journals. A major source of controversy will be the increased need for databases to allow access to the scholarly journal literature, and the focus will not be on innovation but on standards. Metz added to Lynch's conclusion with his own belief that whether all of this succeeds is more a marketing question than a technical one. Simply put, electronic communications will succeed if scientists and scholars find it useful.²⁶

In order to take advantage of this future electronic environment, academics must become more informed about all of their options both for research and publication. The greatest contribution that electronic journals will make to the present scholarly communication system is more diversity and choice, and in future years, electronic publishing will likely move beyond the imitative phase into something entirely new, changing the way we think about scholarship and communication.

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²⁵Paul Metz, "The View from a University Library: Revolutionary Change in Scholarly and Scientific Communications," Change [Online] 27, no. 1 (Jan.-Feb. 1995): 28ff, available: Expanded Academic Index ASAP Electronic Collection: A16739704.

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INTEGRATING ELECTRONIC INFORMATION SOURCES INTO THE CURRICULUM

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Abstract

Integrating the use of technology-based library resources into the curriculum is necessary for students to acquire vital information-seeking skills. Learning to select and use electronic information sources found on CD-ROM, mainframe computers and via the Internet enables students to function better in today's information society. This presentation explores ways to integrate the use of electronic information resources available inside and outside libraries into course assignments. Use of the video networking system and 24 PCS in APSU's new Library Instruction and Computer Room to create an active learning environment is addressed. Experiences with the Heritage-Writing, Speaking and Researching Across-the-Curriculum course at Austin Peay State University are included. Electronic information resources covered in the Heritage course are Felix G. Cat, APSU's new Windows-based, client/server online catalog, InfoTrac's Expanded Academic Index, an index to periodical articles, and Internet tools such as World Wide Web. Ways in which students can incorporate electronic information resources into their use of WordPerfect and other applications to write papers, create annotated bibliographies and complete other assignments are discussed.

Overview

New electronic information sources found on CD-ROM, mainframe computers and via the Internet are beginning to take up residence in all libraries. We are working with our faculty at Austin Peay State University to integrate these sources into course assignments. We consider the future to be very exciting as we teach students how to include electronic sources in their projects through multi-tasking. Two particular concerns for us are balancing coverage between print and electronic sources and helping students understand that not *all* information is available via computers. Our presentation today includes some of our ideas about the dynamics of library instruction in an electronic environment, as well as some of the active learning experiences we include in the Heritage-Writing, Speaking and Researching Across-the-Curriculum courses which we team-teach.

Integrating Electronic Information Sources into Course Assignments

Is preparation for library instruction any different in an electronic environment? Does technology change instructional content? These are questions we want to explore. DeAnna Nipp (1991) argues that the basic research process is not changed by the presence of electronic sources. "The need for a basic understanding of the library....remains the same" and users need to place an electronic source "in the context

of the process of which it is a part" (p. 42). Taking this a step further, Cerise Oberman (1995) states that "... librarians cannot allow technology to be the sole engine driving or defining their instructional efforts" (p. 36). She does, however, believe there is a need for librarians to "unmask technology" for users by planning instruction so that students learn "what technology can and, more importantly, cannot provide them" (p. 39). Let's look at planning library instruction, as well as instructional content, to see how electronic sources influence instruction.

Planning Library Instruction

Since most library user education directly relates to a specific class assignment, I begin planning library instruction by talking to faculty about assignments. There are certain questions that need to be asked every time. What type of library-related work are students assigned? How many information sources are students required to cite in their work? Are students allowed to use books and popular magazines, or must they use scholarly journals? When is the assignment due? Once I know the assignment, I can select sources I think will help students identify the information they need.

In selecting sources, both electronic and print are considered. What drives the selection? Is it expensive technology which is new and exciting? Is it the desire to use familiar print sources? Our selection should be based on which sources provide the information needed at the appropriate level of the user.

Once I select the sources to cover, I plan the session to include time for hands-on work, which becomes even more important with electronic sources. Hands-on work allows students to learn by practice and allows us to help who experience problems. Although we cover fewer sources in less detail, we believe providing hands-on time empowers the students and encourages them to take responsibility for their own learning. We also provide additional individual one-on-one instruction at the library's reference desk at the time the specific information need occurs. Next, let's look at preparing instructional content.

Instructional Content

It has always been a challenge to decide what content to cover in the short time usually available for library instruction, and we are finding it is an even greater challenge when both electronic and print sources are involved. Traditionally, we have taught search strategy and the mechanics of using print sources. To that we now add the mechanics of using electronic sources. Which keys on the keyboard are used to accomplish what task? When is the mouse used? How is the information printed and/or downloaded? We must address all these questions to some degree.

Teaching mechanics can easily fill the entire time, but we really need to continue to teach students how to determine what types of information sources provide the information they seek and how to develop a search strategy. Students must learn to ask

certain questions. Do I need current information found in popular magazines or journal articles? Is the information I need a simple fact found in an encyclopedia? Students then need to learn to formulate a search strategy based on the sources that will either provide the information or lead them to it. During this process, they must ask what is it that specific sources cover. What subject area is covered by the source? What periodicals are indexed? Are the periodicals scholarly and/or popular? What is the range of years that is included? They must also learn to cope with logistical considerations, such as which materials are held locally, which are available immediately via the computer or obtainable from other locations.

Besides learning how to use specific sources and formulating search strategy, students must learn when to approach a librarian. As we all know, sometimes students need help evaluating their search strategies and finding additional sources to consult. Finally, students must learn to evaluate materials to see if they are useful to the project at hand. We can teach them some evaluation techniques, such as noting the currency of the information, the author's credentials, the author's purpose and any bias on the part of the author. We can provide students with opportunities to learn how to be smart consumers of information by providing an active learning environment.

Active learning in an electronic classroom

Where electronic sources are taught is very important for the success of the instruction. In September 1994, APSU's Woodward Library opened a room called the Library Instruction and Computer Room (LICR). Funded with Information Technology monies generated by student fees, the LICR contains 23 student computer workstations and one instructor workstation, plus instructional equipment including an LCD projector and a video networking system. When the LICR is not used for formal library instruction sessions, the room serves as a computer lab for APSU students to write papers and other written assignments, check their e-mail, surf the Internet, and sometimes, they even use traditional library information sources.

The video networking system networks students' and instructor's workstations together and allows us to control the student workstations. We are able to transmit images from our workstation to all or selected workstations while freezing the students' keyboards and mice. Images from student workstations can also be received on our workstation and projected via the LCD projector to a projection screen.

We use this equipment to support active learning experiences for students. Sometimes we use the video networking system to demonstrate electronic sources for part of the session, followed by hands-on work by the students. We assist students as they work on their own. A variation is to have students tell us each step to take as we

demonstrate a source. The LICR facilities aid us in giving students the chance to take an active role in learning about various information sources available inside and outside the library. The library instruction integrated into APSU's Heritage Program characterizes some of the efforts we are making to integrate electronic sources into the curriculum through active learning experiences.

Heritage Experiences with Felix, InfoTrac, the World Wide Web and Gopher

Our involvement in the seven-year old Heritage Program gives us the opportunity to conduct several library instruction sessions with the same students over the course of two semesters. Not being confined to a one-shot hour long session allows us to integrate use of the library into these courses and to try different active learning experiences with the same students. These efforts enrich our library instruction program as we work to merge instruction about electronic sources with the more traditional library instruction that we conduct.

What is Heritage?

Heritage is an interdisciplinary course involving the humanities, sciences, social sciences and the fine arts, which most other schools call "writing-across-the-curriculum." Students can earn up to 24 semester hours if they follow the program for the two years it is offered. The portion discussed here is Heritage-Writing and

Speaking, otherwise known as Heritage 1010 and 1020. The Austin Peay State University 1995-97 Undergraduate Bulletin describes Heritage 1010 as providing "intensive training in writing across the curriculum, in library research, and the principles of oral communication. Emphasis is on gathering information, evaluating sources, and presenting ideas forcefully in both writing and public speaking" (p. 237). Heritage 1020 is described as "a continuation of 1010, with emphasis on writing about literature and the fine arts" (p. 237).

Who is involved?

The students in Heritage are usually freshmen. It is not an Honors program. Any student is eligible to take it, unless they need to take Developmental English.

The courses are team-taught by professors from the Languages and Literature Department, the Department of Speech, Communication and Theatre, and the Library. There are usually three or four sections of Heritage 1010 and 1020, each with its own coordinating instructor from the Languages and Literature Department and its own librarian. One or two instructors from Speech share the responsibilities for the "oral communication" portions.

What is covered in Heritage?

Heritage 1010 is taught in the Fall semester. It is here that students really experience writing-across-the-curriculum as they read, hear lectures, research, speak

and write on topics in history and the natural and social sciences. In the spring, Heritage 1020 gives them the opportunity to study literature. They learn to find and write literary criticism and theater reviews.

What sources are taught?

The first source which students learn is InfoTrac, a periodical index which covers more than 1400 magazines and journals. We subscribe to the Expanded Academic Index ASAP, and the backfile which dates to 1980; and the Business Index ASAP with its backfile dating to 1983. The students are given a worksheet which not only teaches them "which buttons to push," but how to develop a search statement.

Our automated catalog, Felix G. Cat, is the next source that they learn. Felix is the Ameritech Horizon product modified to meet the needs of our library's users. The database contains more than 200,000 items included in the reference and general book collections, videotapes, music CDs, juvenile collection, and Special Collections. The students are taught the various ways of searching the catalog and learn which kind of search to choose depending on what information they have. Since printing a bibliography involves many steps, the students are given directions on how to produce a sorted list.

The World Wide Web offers a variety of resources for all kinds of interests. The students are shown Netscape, our graphical web browser, and given URLs relevant to

specific disciplines. Yahoo and OpenText are also presented so that they can locate other sites of interest. They may access history sites, authors' home pages, or locate bibliographies for an author whom they are studying. Also presented are the print Internet search guides which they may use to obtain the addresses for other sources.

The Austin Peay State University Gopher offers them the opportunity to search the online catalogs at various area libraries. The students enjoy this as sometimes a friend enrolled at one of these universities can go to his or her library and check a book out for the APSU student. They can often deliver it faster than Interlibrary Loan can obtain it. Another item on the gopher is LC Marvel, the catalog of the Library of Congress. Students can browse its comprehensive holdings and identify an item to request through Interlibrary Loan.

These are the specific sources about which we want the Heritage students to learn. We hope they realize that they have only learned a very small number of resources and that many more are available both here at the Library and in cyberspace. Once the window of opportunity is open to them to use the Internet and the Web, we hope that they will discover other useful sources and share them with us.

Incorporating Electronic Sources into Student Projects

There are many technical, conceptual, and instructional issues involved in trying to integrate electronic sources into the curriculum. Providing the equipment, software and knowledge needed to accomplish this is a major part of this process. The APSU library is addressing these issues by envisioning an ideal for the future and working toward it.

The "Pre-scholar's Workstation"

In order to take advantage of the new possibilities unveiled by technology, the APSU library plans to provide a "Pre-scholar's Workstation" for our patrons. Unlike a "Scholar's Workstation," which contains specialized information resources for one discipline on a single workstation, our workstation will contain general interest, undergraduate level resources for many different disciplines and tools to manipulate the information. Undergraduate students can get the same benefits from one-stop shopping as scholars: time savings, less confusion about available resources, and reduced paper usage. Because these stations will have many applications and resources on them, students will be able to download or copy quotes and bibliographies directly into papers. They can also use graphics and other multimedia elements for other types of projects. Key to students' use of these capabilities is the cooperation of the faculty. Encouraging or requiring students to use some electronic sources in assignments is

often the only factor motivating students to learn and use the resources. Faculty can integrate electronic resources into traditional assignments, such as requiring at least one Internet source for a research paper. A more ambitious student project is to download graphics and information from companies' home pages for brochures created for a technical writing class.

The Project

Creating a complete Pre-scholar's Workstation will require additional resources and reconfiguration of those already present on library and campus computers. The workstations in APSU's Library Instruction and Computer Room are currently close to the ideal, since they have the online catalog, InfoTrac databases, SilverPlatter CD-ROMs, word processors and Internet access available, including open web access through Netscape. For security reasons, our "InfoStations" (reference area computers) do not have word processors or Internet access available. With new security programs, we hope to make limited versions of these resources available soon. Some of these services are already accessible in other offices and labs on campus with expansion to the rest of the campus planned. We also need to add more resources such as FirstSearch and web-based computer-assisted instruction programs to all machines. Ideally, we want to use a web page as our initial menu screen, and to use web interfaces for our different services to give them more uniformity. As we move toward

the ideal Pre-scholar's Workstation, we must also work to familiarize students and faculty with what is available on the workstations, and teach basic multi-tasking skills such as copying, pasting, and downloading information.

Concerns

Although we believe integrating electronic resources into the curriculum is needed and is beneficial to our patrons, there are some concerns involved as well. The first is the danger of creating "computer blinders," in which students ignore any resources that are not computerized. An important point we emphasize in our instructional program is choosing the most appropriate resource, whether it be paper-based or electronic, for the patron's needs. Stressing the need for evaluation of information authority and reliability is also important in instruction. These issues have always been a concern for librarians, but the advent of the Internet as an information resource increases their importance.

Another concern is the ease with which electronic information can be plagiarized. While the Pre-scholar's Workstation does make it easier to copy information and call it your own, it also makes it easier for faculty to check these resources to confirm suspected plagiarism. The last concern I will discuss here is the problem of citing electronic resources. Although this is currently an area of much

confusion, several different style guides have now appeared that can easily be used. Certainly time will consolidate these styles into a few standard guides, such as now exist for citing traditional resources.

Conclusion

We believe integrating electronic resources into the curriculum and encouraging the use of new applications such as Netscape benefit students and the campus as a whole. Not only does it get them the information that they need, but it also forces them to become more technologically sophisticated. Their new knowledge and skills will help them not only in their personal lives, but also in the workplace.

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Track Sessions



Track 4: Support for Faculty



Mid-South Instructional Technology Conference



**Defining the Role of the
Instructional Technologist in Higher Education**

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Abstract: Many colleges and universities have begun to hire Instructional Technologists. The role, qualifications, and responsibilities of the Instructional Technologist are often ill-defined. This paper describes the various roles the Instructional Technologist can play in higher education and describes the typical activities and qualifications of each role. The paper includes a description of ten recent Instructional Technologist position announcements from colleges around the country. The paper also includes a discussion of the key questions colleges should ask themselves before hiring an Instructional Technologist. A series of recommendations for developing a position description are included.

Running Head: Defining the Role of the Instructional Technologist

Defining the Role of the Instructional Technologist in Higher Education

Overview

An impressive variety of changes in society, technology, and the economy have been exerting pressure on higher education for decades. Direct government subsidies for higher education, never in great supply, have begun to shrink at a rapid pace. Fewer, less experienced, faculty are having to teach an increasingly large number of students. Students are getting older, with many students working at least part time and unable to attend classes full time. In spite of these, and a litany of other changes, the traditionalist in higher education has argued that, in the end, the structure and organization of the university were hallowed and timeless and would endure in spite of any external influences, regardless how powerful.

While the traditionalist view of higher education is still prevalent, many observers, inside and out of academe, have gradually come to see the need for reform. A recent review of higher education in *U.S. News & World Report* (1994) effectively and bluntly described the situation:

Like it or not, colleges and universities are, in fact, labor intensive enterprises that operate in high cost environments and produce a human product that promises to remain in heavy oversupply for the foreseeable future.....Given the fundamentals, no amount of downsizing, restructuring or tinkering with the economic edges will alter the disheartening outlook.

That disheartening outlook has forced even the most optimistic supporter of higher education to begin to consider alternatives to the present situation. Almost every college

and university has, in recent years, at least begun to explore new and innovative solutions to traditional practices. One of the most commonly discussed alternatives is the increased use of technology.

The Role of Instructional Technology

One of the most powerful and potentially valuable alternatives to the dire state of higher education is to move away from the traditional teacher centered instructional approach to newer, technology-based learning environments. The approach is revolutionary, to be certain, but dire circumstances call for drastic alternatives. *The U.S. News & World Report* review of higher education supported this revolutionary approach:

Indeed, nothing short of an entirely new vision of the educational process will enable the large majority of schools to control costs...the only real solution to the financial dilemma: a massive, cooperative and foundation-aided development and deployment of instructional technology . . . while the many pedagogical Luddites in the academy still resist the computer as both inhuman and expensive, for Generation S, raised on Ninetendo, MTV, and CompuServe, working with multimedia may be more familiar, flexible, and effective way to learn than sitting in huge classes.

This growing realization that technology can be an important answer to the problems of higher education is tempered by the knowledge that, to date, technology has made a relatively small impact in most colleges and universities. In even the most technologically advanced colleges, most instruction is delivered in the traditional lecture format and technology, if it is used at all, remains an afterthought. *The Chronicle of Higher Education* (1989) described technology's impact:

Although experiments with technology are under way, on the whole they remain just that -- experiments. The vast majority of faculty members and administrators simply have

no sense of the implications or the possibilities of using technology to teach, counsel, and administer.

Why has technology made such a small impact in higher education? There are many reasons, of course, including high start up costs, technologically illiterate faculty and administrations, inadequate technological solutions, outdated facilities, traditional mindsets, and general resistance to change. How can colleges increase the use of technology? There are many answers to that question, as well, but the recent trend of hiring Instructional Technologists has shown promise as an effective and cost-efficient method to increasing the use of technology on campus.

Metaphors

What, exactly is an Instructional Technologist? There appear to be many different answers to that important question. The role of the Instructional Technologist is often described in metaphors -- descriptions that relate the job of Instructional Technologist to other, more commonly known, jobs. This section describes several of the most common metaphors for the Instructional Technologist and outlines some of the important activities of each. It should be noted that the following metaphors are not exhaustive or mutually exclusive. There may be other metaphors not described here and it is common for the Instructional Technologist's job to combine, in varying degrees, two or three of the metaphors.

Consultant

The Consultant primarily responds to faculty interests and activities. Rather than setting the agenda, the Consultant works closely with faculty and staff on a variety of projects and provides support, advisement, and input in a number of areas. Typical activities of the Consultant include helping faculty identify and evaluate instructional

software, consulting in the design and development of curriculum materials, identifying appropriate hardware and peripherals, bringing faculty with like interests together, and brainstorming innovative solutions to instructional problems. The Consultant is also often charged with staying abreast of the latest instructional technologies and communicating that information to faculty and university administration. The Consultant may also work closely with administrators and staff in the process of strategic, long term, planning for the integration of technology. The Consultant will often hold a doctorate in Instructional Systems Design or Instructional Technology and may have several years professional experience with information or instructional technology.

CAI Developer

The CAI Developer has primary responsibility for developing computer-assisted instruction and presentations. Often called a Multimedia Specialist, the CAI Developer works with faculty to develop a variety of instructional products. The CAI Developer will typically create interactive instructional modules using such popular authoring systems as Authorware Professional, Macromedia Director, Multimedia Toolbook, IconAuthor, and HyperCard. The CAI Developer should have experience with multimedia peripherals such as scanners, digital cameras, slide scanners, external storage devices (such as tape drives) and projection devices (such as LCD panels). In recent months, the CAI Developer has also come to be tasked with understanding the Internet and developing instruction to be delivered via the World Wide Web. The CAI Developer will typically hold a Master's Degree in Instructional Design or Instructional Technology and may have several years experience in developing computer-assisted instruction in business or industry.

Trainer

The Trainer is primarily responsible for developing, conducting, and evaluating training workshops in areas related to instructional technology. Typical activities of the

Trainer include determining which workshops would be most useful, developing training materials and hand outs, promoting and coordinating workshops, conducting training sessions, and evaluating workshops. Common workshop topics include using the Internet, creating World Wide Web pages, using popular software packages such as Microsoft Office, and developing CAI with HyperCard or ToolBook, for example. The Trainer could hold a Master's or doctorate in Instructional Technology or a related field and usually has several years experience as a Training Coordinator in business and industry or classroom teaching experience in higher education.

Lab Manager

The Lab Manager is primarily responsible for coordinating the hardware and software in one or more computer labs. The Lab Manager will typically serve as network manager, manage the day to day activities of the lab, supervise Lab Assistants, install software, evaluate and purchase hardware and software, combat software piracy and viruses, and consult in the installation of new labs. The Lab Manager will typically have a Master's degree in Instructional Technology or Computer Science and will often have several years experience in the management of networked computer systems in business or education.

Distance Learning Expert

The Distance Learning Expert is primarily responsible for purchasing, installing, and maintaining distance learning equipment. The Distance Learning Expert will typically manage one or more distance learning classrooms, work with vendors and local service providers, manage satellite downlinks, supervise Student Assistants, and provide technical support to faculty using the facilities. The Distance Learning expert may have a Master's degree in Instructional Technology but, since academic training programs in Distance Learning are relatively scarce, will more likely have advanced training in a relevant

technical field. Most Distance Learning Experts come to the job with several years experience working with compressed video and satellite technology in business, industry, or education.

Some Distance Learning Experts are also tasked with program development and coordination duties. These duties would include lining up faculty to teach distance learning courses, assisting faculty in teaching via distance learning, securing grants for the maintenance and purchase of equipment, evaluating distance learning courses, and working with other institutions in the service area to facilitate shared courses. It is not unusual for Distance Learning Program Coordinators to be faculty from various departments with distance learning experience, often with 1/2 to full release time.

Technician

The Technician is primarily responsible for maintaining, installing, and troubleshooting instructional hardware and software. Common activities of the Technician include the set up, upgrade, and minor repair of personal computers, the installation of software, minor repair of audio-visual equipment, installation of peripherals and projection devices, and coordinating service agreements and major repair projects. The Technician may have a Master's degree in Educational Media, an electronics or technical degree, or several years practical experience in computer and AV repair.

Key Questions

Before writing a position announcement for an Instructional Technologist, it is important to ask several key questions. The answers to these questions will help to define the scope, responsibilities, and qualifications of the position and will effectively focus the position announcement.

Faculty or Administration?

Will the Instructional Technologist work primarily with Faculty or Administration? "Faculty" may seem like the obvious answer but it is important to consider how much time will be devoted to each group. Will the Instructional Technologist be expected to serve on any university-wide committees? If so, which committees and what will be the extent of the participation? Will the Instructional Technologist be expected to work on special projects for key administrators? For example, will the Instructional Technologist be expected to work with Academic Computing in the design of computer labs?

Training or Development?

Will the Instructional Technologist be primarily responsible for developing instructional materials or training faculty and staff? The answer to this fundamental question will go a long way in defining the role of the Instructional Technologist. The development of instructional products is a labor-intensive, time consuming process. If the Instructional Technologist is to serve as a CAI Developer, they will be working very closely with a very small percentage of the faculty. If the Instructional Technologist is to be primarily concerned with development, who will decide the often politically-sensitive question of which faculty projects are developed and which are not? If an Instructional Technologist is to serve as a trainer, then they will have a relatively small amount of interaction with a higher percentage of the faculty.

In practice, of course, most Instructional Technologists will be asked to do both training and development. It is, therefore, very important to consider how much time the Instructional Technologist will be expected to devote to each (20% Training and 80% development, for example).

Reactive or Proactive?

Will the Instructional Technologist be primarily responsible for responding to faculty requests or for setting the technology agenda? The answer to this question should be explicitly stated in the position description. It is possible for the Instructional Technologist to become so valuable and well-known among the faculty that 100% of the Instructional Technologist's time is consumed answering phone and email requests for assistance. Conversely, it is possible for the Instructional Technologist to be so involved in serving on committees, performing special projects, writing grants, conducting training, and installing labs that there is no time left to respond to faculty needs. The Instructional Technologist can find themselves in a "Lose-Lose" situation unless the parameters of the position are made explicit to all concerned parties from the outset.

Hardware or Theory?

Will the Instructional Technologist be expected to have expertise in hardware or theory? Many IT professionals with Master's and doctorates in Instructional Technology have very little hands-on training with the maintenance and operation of computers and networks. These professionals are usually trained in the rather esoteric theories of instructional design, educational psychology, curriculum development, computer-assisted instruction, product evaluation and media selection. While these are undoubtedly useful skills, most faculty do not want assistance developing instruction or specifying objectives. The average faculty person wants someone to help them with their computer, in using specific software, employing multimedia peripherals, and conducting network functions.

The dilemma inherent in the Hardware or Theory question is that most candidates with academic credentials in Instructional Technology are largely unprepared in the practical, hands-on tasks desired by faculty. The solution is to explicitly state the requirement for practical experience with computers and networks in the position announcement.

Campus or School?

Will the Instructional Technologist be expected to work with all departments on campus or specifically with one department of school? If the Instructional Technologist is expected to work most closely with one department (Special Education, for example), it may be important for the position announcement to state that and express a preference for candidates with subject area knowledge as well as instructional technology skills.

Academic or Service?

Will the Instructional Technologist hold an academic (faculty) position or a service position? If the position is a faculty appointment, will it be a tenure-earning position? What academic department will the assignment be to? What percentage of the faculty assignment will be for teaching and how much for service? If the position is a tenure-earning, 100% service position, is there a method in place for evaluating and reviewing progress towards tenure for such a position? If the Instructional Technologist will hold a service position, what department will the position be in and who will supervise the position?

Recent Examples

Many colleges and universities have begun to hire Instructional Technologists. Several position descriptions for Instructional Technologist positions have begun to appear in the *Chronicle of Higher Education* and other higher education job banks. For purposes of this paper, the author analyzed ten recent examples of Instructional Technologist position descriptions. The results of the analysis are shown in Table 1.

The 10 examples in Table 1 were taken from the on-line Job Placement Center of the Association for Educational Communications and Technology (AECT) Home Page on

#	University	Title	Responsibilities	Qualifications	Metaphor
1	Albion College (Michigan)	Instructional Technology Coordinator	Support the products that are used by faculty for instruction and research, plan development activities, organize workshops	Bachelor's degree in a field related to the Sciences, one year experience in computer training and support	Consultant / Trainer
2	Daytona Beach CC (Florida)	Director of Instructional Development	Establishes and coordinates curricular and instructional development projects providing support for faculty and staff	Master's degree or doctorate in instructional development, curriculum design, educational technology	Consultant / CAI Developer
3	Moraine Valley CC (Illinois)	Coordinator Instructional Technologies	responsible for operation of Instructional Technologies areas and for providing technical support for Distance Learning Classroom	Bachelor's Degree in education, experience working with AV/compressed video/closed-circuit TV/satellite downlink	Distance Learning Expert
4	New York University School of Education	Faculty Position (Rank Open)	Teaching, research, service, advisement, provide strong leadership in the integration of educational media and technology	Earned doctorate in educational communication and technology, excellence in teaching, scholarship, instructional media development	Consultant
5	Ohio University College of Osteopathic Medicine	Coordinator, Faculty/Curricu- lum Development	Coordinates, conducts and evaluates faculty development activities, assists with curriculum design and evaluation	Doctorate in education, psychology, one-two years experience teaching or faculty/curriculum development	Consultant / Trainer / CAI Developer
6	Sul Ross St. University (Texas)	Educational Technology Specialist	Train faculty in emerging instructional technologies, establish interactive media training lab, develop CAI, maintain inventories of equipment	Bachelor's or Associates' in Computer Science, current knowledge and demonstrated experience in new instructional technologies	All
7	University of Michigan - Dearborn	Education Technology Specialist (Non-tenure faculty)	Provide technical expertise and support to an interactive television based (not Internet) distance learning network	(Not specifically stated)	Distance Learning Coordinator / Consultant
8	University of Texas at Arlington	Technology Specialist (Tenure Track Assistant Professor)	teach cutting edge multi-media technology/computer literacy, help teacher educators integrate technology into the classroom	Earned doctorate, evidence of 3 years of teaching in elementary or secondary schools, experience with educational technology	Consultant / CAI Developer
9	Warren County CC (New Jersey)	Director of Instructional Technology and Career Programs	provide leadership for academic instructional technology and will develop career degree/certificate programs	master's degree in instructional technology, education, or career related field. Five years experience in instructional technology	Consultant
10	Western Carolina University (North Carolina)	Instructional Technology Specialist	develop and implement an ongoing training and education program for faculty	Master's degree in education, doctorate preferred, successful teaching experience, professional multimedia preparation	Trainer

Table 1. Information related to 10 Instructional Technologist positions in higher education. Taken from the Association for Educational Communications & Technology on-line job announcements during January, 1996 (gopher://sunbird.usd.edu:72/11/jobs/)

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the World Wide Web (gopher://sunbird.usd.edu:72/11/jobs). The position announcements appeared on the AECT Home Page in January of 1996. A complete list of the ten position announcements analyzed for this paper is available by contacting the author.

Table 1 shows that of the ten Instructional Technologist position announcements, the Consultant, Trainer, and CAI Developer metaphors were the most commonly used. Eight of the ten announcements described a position that consulted closely with faculty in various instructional activities. Four of the announcements described training as a primary responsibility of the Instructional Technologist and four described a primary responsibility as CAI development. Interestingly, six of the ten announcements included multiple primary responsibilities such as training and CAI development or consulting and training.

Of the nine position descriptions that explicitly stated a level of academic training, three required a doctorate, three required a Bachelor's degree, two required a Master's degree and one required a Master's or doctorate. Many of the announcements expressed a desire for the Instructional Technologist to have from 1 to 5 years experience in areas related to computers, teaching, or technology. Table 1 does not include a discussion of salary, but five of the ten announcements did specify a salary. These salaries ranged from \$21,540 to "the mid 40's."

Recommendations

The following recommendations are provided to help in defining the role of the Instructional Technologist and crafting an effective position announcement:

1. *Work With Faculty, Staff, and Administrators in Defining the Role of the Instructional Technologist and Developing a Position Announcement Before Beginning the Hiring Process.*

As with any new position, there are many stakeholders in the decision to hire an Instructional Technologist. Seeking input and advice from all the stakeholder groups will assist in defining a role for the new position that is responsive to the needs of the various groups. Also, discussing the key questions and metaphors described in this paper will give all the stakeholder groups an insight into the scope of the position and help to avoid problems after the new person is actually brought on board.

2. *Clearly Define the Instructional Technologist Job Description and Avoid Impossibly Broad Responsibilities*

There is a tendency when writing job descriptions in general, and Instructional Technologist descriptions in particular, to include so many responsibilities that no one person could satisfactorily conduct them all. Instructional Technologist job descriptions are often broad, ambiguous, and ill-defined. One result of this ambiguity is the receipt of a large number of applications, most of which are not even remotely qualified for the position. Another result of ambiguity is inflated expectations from various stakeholder groups. An ambiguous job description could allow each stakeholder group to believe that the Instructional Technologist's time will be devoted primarily to them. As a result, when a person is actually hired, they are put in the impossible situation of having to be "all things to all people." A clearly written announcement that explicitly states specific responsibilities and qualifications will eliminate most of these problems.

3. *Clearly Define the Organizational Position of the Instructional Technologist.*

Instructional Technologist position announcements often call for time to be split between two departments. For example, the Instructional Technologist may report 1/2 time to Academic Computing and 1/2 time to the College of Arts & Science. This arrangement often results in problems related to administrative and clerical support, tasking, performance review, and promotion, advancement, and salary. The best plan would

probably be to avoid having the Instructional Technologist report to two units, but the political and fiscal reality at many colleges often make such an arrangement necessary. When a splitting of time is required, a clear arrangement that specifies time, tasking, support, and advancement criteria should be in place before the review and hiring process is begun.

4. Emphasize Interpersonal and Professional Skills When Hiring an Instructional Technologist

In a very real and important way, the job of the Instructional Technologist is concerned more with people than with technology. The job of facilitating the introduction of technology into higher education requires, above all else, the ability to get along with people. The Instructional Technologist will have to work closely with a wide variety of people ranging from technological Luddites who hate and fear innovation and want nothing to do with technology to technological Utopians who see the latest innovation as the next great solution to every problem. The Instructional Technologist must be sensitive to the ideas, ambitions, hopes, fears, and needs of diverse people within the inherently diverse setting of a modern university. Interpersonal and professional skills, especially written and verbal communication skills, are the most important and often used tools of an effective Instructional Technologist.

Summary and Conclusion

In summary, higher education is rapidly changing. Society has changed dramatically over the last few decades and colleges and universities are slowly beginning to realize that they will have to change in order to survive. A common realization in higher education is that an increased utilization of innovative technologies is essential to meet the educational demands of a changing society. In order to facilitate the increased utilization of

technology, many colleges are hiring Instructional Technologists -- professionals with a wide set of training, qualifications, and responsibilities. Before hiring an Instructional Technologist, colleges should clearly define the role and scope of the position. Overly broad, ambiguous, or ill-defined position descriptions can hinder the effectiveness of the Instructional Technologist and impede the integration of technology. On the other hand, a well-defined position description can result in the hiring of a valuable professional who will be an effective and cost-efficient force for change.

Author's Note

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**An Integrated/Multidivisional Approach to
Instructional Multimedia Development**
Mid-South Instructional Technology Conference
Middle Tennessee State University
April 2, 1996

Dr. Craig Henderson
Department of Civil and Environmental Engineering

Jeff Gold
D. W. Mattson Computer Center

Billy Tindall
Educational Technologies Center

History of TTU Educational Technologies Center

A. 1992-93

- VP for Academic Affairs forms Instructional Technologies Ad Hoc Committee
- Committee solicits project proposals
- Committee recommends spending \$31,000 for large screen projection systems (establishing sites for scheduled use of instructional technologies)
- Funds provided to establish an Educational Technologies Center
- Computer Center Director funds hardware, software, and student salary

B. Goal is to provide spark to ignite excitement/interest and provide support for use of technologies to support instruction

C. The Educational Technologies Center

- Politics involved
- must be separate activity from the Computer Center
- must find location where will the Center be housed (Library provided site)
- funding
- staffing
 - Academic Computing Support Manager coordinates
 - Student funds used for hiring a student multimedia specialist
- Getting it going
 - cleaning out the "store room"
 - using previously unused Library videoequipment
 - bringing over the very low usage Computer Center film recorder

D. Immediate results

- high usage of color transparencies
- case study videos
- computer controlled slide shows
- color scanning
- VHS film editing
- color prints
- color slides
- support for getting other funding

"The College of Business has been awarded a \$99,000 grant from the TVA to establish multimedia training center. This project will make great contributions to the regional business community. The Educational Technologies Center was instrumental in being able to pursue the grant. Last fall, I allocated a portion of my time every week to discovering how I could use technology in my classes. While working with Billy Tindall (the multimedia specialist at the center), the spark came for the idea to start a center to use this technology in business training. We both could see the synergism of additional technology in the classroom. After working closely with the head of the College of Business on funding sources, and Mr. Gold

on capabilities and equipment needs, and the research office on grant issues; the proposal was submitted.

... And, I would like to acknowledge that the spark for the TVA multimedia center came from working with Billy Tindall and Jeff Gold."

-Kevin Liska, Director of the TTU Business Media Center

Since the Ed Tech Center opened, there has been an enormous increase in the level of electronic presentation activity at the departmental level. Originally, the Center's color inkjet printer was almost the only one on campus. We printed hundreds of transparencies a year. Now, many departments have their own color printers and can print their own graphics. Many faculty member-- now have computers in their own offices that are capable of creating electronic slide shows for classroom lectures or for presentations. Microsoft PowerPoint, WordPerfect Presentations, and Lotus Freelance are the most popular. And most departments now have some type of equipment in one or more of their classrooms that are capable of displaying these graphics. Some have permanently-mounted 3-gun projectors. Some opted for multimedia carts complete with computers, CD-ROM drives, visual presenters, and VCRs attached to 27-inch display monitors that can be rolled from classroom to classroom. Still others have portable color LCD display units, either panels that fit on top of an overhead projector or self-contained units capable of displaying data or video with stereo sound.

A great deal of time used to spent working with faculty and departmental staff members to produce materials for publication. Now most departments have trained people to do most of their desk top publishing in their own offices. The computer center staff used to handle the film recorder, but there was no one who had the time to really learn all of its capabilities and its shortcomings, so there was no one to coach faculty and students through the process. Now that this equipment is housed in the EdTech Center, it is being used constantly. Faculty and students are counseled on such things as content, layout, and design, pointing out which color schemes work well under certain lighting conditions, what the shortfalls of the software and hardware may be, and so forth. The break-even point cost-wise between color transparencies and 35mm slides for our campus is about 5. Transparencies cost about \$3.00 each, and a roll of slide film with developing runs about \$15 - \$16. The same quality graphics can be put on either. Of course, the slides do have much higher resolution than 300 dpi transparencies.

Most clients have their film developed on-campus at Photographic Services. Photo Services generally develop slides twice each week, meaning that clients almost never wait more than 2 or 3 days to get their slides. Most other places send the film out of town for about a 2-week turnaround. And Photo Services will, for a higher price, develop and mount slides in one day.

Many departments, notably Biology and Cooperative Fisheries, use slides constantly. Departments such as these have developed their own local experts who assist other faculty and students in developing their materials to be printed to slide film.

Some of the student employees have been trained in how to not only operate the film recording equipment but also in how to help the clients develop their materials. All of these things help to free up more of the multimedia specialist's time so that he can manage larger projects.

More faculty are using presentation software in the classroom and for professional development. Other faculty members see this and decide to try it out for themselves. They also see this technology at conferences and on the World Wide Web.

With the creation of the Instructional Technology Roundtable, faculty see increased support for their ideas for using technology in the classroom in the University Administration. They are feeling more comfortable in expressing their creative ideas with myself and with their colleagues. Even the old "fuddy-duddies" who don't like to change anything are beginning to see the advantages of not being left behind on the old chalkboard. They are getting bold enough to suggest what they might like to do, knowing that they won't be belittled. They are beginning to let their imaginations get into their classroom preparations. The Center can even take something like this photographic of the University Library and something like this pencil drawing of the Library and make this morphing sequence into a digital video clip.

The Center is now doing larger video productions. They are producing career tapes for Basic Business -- short segments and interviews with faculty, students, and alumni of the various departments within the College of Business -- which will be used to help freshmen Basic Business students decide on a major. Tapes being produced for University 105 give sample lectures from various professors in different departments and colleges to expose freshmen to different styles of lecturing.

The Academic Development Program wrote skits that used student/faculty interactions to illustrate their methods of dealing with students taking remedial coursework.

These skits were videotaped and shown at a prominent conference as part of their overall presentation.

They are doing more tapings that involve combining both electronic and photographic slides, analog and digital video, multiple sound tracks with voice and music overlays, and extensive use of titling and other post-production effects.

They have just received our CD-Recorder equipment, and they already have several projects awaiting production. The Library Archives has hundreds of very old photographs from a local studio that has been out of business for decades. These images are decaying with each passing day and need to be preserved as they are almost the sole photographic record of local historical events and landmarks. The Library staff spend countless hours providing tours to incoming students. This orientation could be designed into an interactive CD-ROM-based program for a kiosk or for use on any of the campus networked computers.

The new Dean of the College of Arts and Sciences has said that all incoming freshman in that college must have a certain competency level in such areas as word processing, database manipulation, and other basic computer skills. These basic skills are taught in a course called Computer Science 110 which is primarily taken by upper classmen. Requiring this as an entry-level course could completely swamp the departmental faculty. The Center is going to create an interactive, CD-ROM-based program to test a student's skills in these areas. This program could be made available securely on any campus networked computer with the results of the testing be convey it more effectively in a classroom environment.

For example, seismic codes have specific provisions regarding geometric or vertical irregularities in buildings. These irregularities might induce torsion in a structure due to unsymmetrical building shapes. The conveying of this concept is very important in the context of seismic design or structural dynamics. Yet it is extremely difficult to convey on a blackboard. The Interactive Seismic Database may be used as a tool by the professor to demonstrate -- using actual damage photographs -- the importance of avoiding these geometric or vertical discontinuities in structures. Also, similar structures that responded differently to a seismic event can be studied. Likewise, the students could be assigned the task of using the ISD to investigate damage resulting from torsional forces on irregularly shaped structures and provide methods of construction that could have been used to prevent the damage. In this way the student begins to understand the theory of structural dynamics, the principles behind code restrictions, and the ramifications of their decisions on real buildings.

**Supporting Faculty's
Development and Use of Instructional Technology**

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ABSTRACT

A projected image of a three-dimensional model rotates and changes with new data in front of a classroom of students studying a new mathematical theory. The speech given by the President less than 24 hours before is displayed for a political science class as the students discuss its various points. Instructional technology is allowing students to visualize complex ideas and understand abstract concepts in a manner that simply is not possible with the use of just lecture and a chalkboard. The use of instructional technology in a class and the impact that it has on students are almost wholly dependent on individual instructors. While a small percentage of faculty, early adapters of technology, will integrate technology into their courses with little prompting or assistance, most faculty will not. Mainstream faculty typically need encouragement, ready access to technology, training, and support before they take steps toward enhancing how and what they teach with the use of technology.

Introduction

In 1989, the administration of Middle Tennessee State University (MTSU) made a commitment to technology on a large scale when the decision was made to provide every full-time faculty member with a microcomputer. During that year, workshops covering the use of a variety of software applications were offered to the faculty. In 1994, the Office of Information Technology (OIT) initiated the development and installation of MTSU's first master classrooms, and an academic committee was formed to award release time and summer pay grants to faculty developing instructional technology. In 1996, the MTSU Foundation funded an annual award for outstanding achievement in instructional technology. These milestones and other steps have been taken at MTSU to give faculty the awareness, access, training, support, and recognition that they need to develop instructional technology and effectively incorporate it into their courses.

Awareness

Some of the first questions asked by faculty regarding the use of technology in the classroom include, "What could I do differently with technology?" and "Is the use of instructional technology really useful to my students?" Obviously, faculty needed to know the possibilities as well as the advantages of the use of instructional technology before they were willing to extend the effort it took to bring it into their own classes.

While microcomputers have been on the MTSU campus for a number of years, before 1994 little was being done to integrate their use in most classes. In the spring of 1994, OIT sponsored a faculty symposium that focused on how instructional technology is being used in higher education. Presenters from a variety of disciplines demonstrated how they developed multimedia applications and how they applied them in their courses. Other conferences and symposiums are held annually that feature the various ways technology can change how and what instructors teach.

Access

Faculty need access to technology of all types. Networked computer and audio/visual equipment in faculty offices, classrooms, and multimedia development facilities must be readily available. The equipment must also be reasonably up-to-date, stable, and reliable.

First and foremost, every faculty member should have a computer on his or her desk. Day-to-day usage of productivity software allows instructors to type syllabi and tests, record grades, send and receive electronic mail, and create handouts and transparencies. Becoming acquainted with the impact technology can have on their office tasks, research, communication, and printed materials is a crucial first step in the evolution of MTSU faculty's use of technology in the classroom.

The almost total absence of computer and audio/visual equipment in classrooms on the MTSU campus severely restricted the use of technology in the classroom. Prior to 1994, a few industrious instructors brought portable computers and LCD panels to class, but this setup proved limiting as well as cumbersome. Eight master classrooms made the necessary technologies both accessible and convenient to instructors for the first time. These specially-equipped classrooms provide a wide range of computer, media, projection, communication, and control capabilities, including connection to the campus network. These rooms are easy to use and feature a wide variety of presentation and demonstration equipment including a computer, document camera, VCR, and laser disc player. During the past two years, over two hundred MTSU faculty have taught in one of these rooms and have creatively used the technology to enhance, complement, or even reinvent their subject matter.

While master classrooms have been on campus for two years, MTSU just recently equipped a multimedia development center. An additional center is scheduled to open in early 1997. These centers feature specialty equipment that a typical instructor does not have in his or her office. A development center list of equipment includes color flatbed scanner, slide scanner, CD-ROM mastering system, and video/audio digitizing equipment. A wide variety of specialty software is also provided.

In addition to permanent facilities, instructors also need access to portable equipment. OIT has a supply of portable computers and LCD projection panels for faculty use. These check-out systems are in high demand and play an important role in making technology available "anytime, anywhere."

Training

Lack of training creates a barrier to faculty's use of technology in general. Faculty require a hands-on experience in workshops and orientations that are offered at convenient times.

With microcomputers arriving on campus in large numbers in 1989, OIT offered the first faculty development workshops. Initially, these workshops covered the use of operating systems, productivity software such as word processing, spreadsheet, and database, desktop publishing, electronic mail, and statistical software. Over the past few years, the workshops grew in number and scope to include the use of presentation and multimedia authoring software. Recently, several workshops focusing on the use of technology in the curriculum and instructional design have been offered.

To make sure that faculty new to master classrooms are comfortable using the equipment, OIT offers orientations in several of these classrooms each semester. One-on-one training sessions are conducted throughout the semester.

Additional training opportunities are available to MTSU faculty with the annual Mid-South Instructional Technology Conference and Faculty Summer Instructional Technology Institute. These events feature a variety of presentations, workshops, and discussion groups that focus on the effective use of technology in higher education.

Support

Support is critical to faculty using instructional technology. They need technical support for the hardware and software in their offices and in the classrooms. They also need support with the development of technology-based instructional tools such as multimedia applications.

Microcomputer specialists and technical support specialists provide faculty with technical support on computer hardware and peripherals as well as software applications. Technical support is also provided for modems and network connections. This support includes acquisition assistance, installation and configuration of equipment and applications, and troubleshooting of hardware and software.

OIT's instructional technology support specialist provides one-on-one assistance with the development of multimedia applications. Additional support includes consultation on the integration of technology into courses and instructional design. Through a list service, the instructional technology specialist provides information to faculty on hardware, software, pedagogy, and training opportunities.

Time

Many faculty understand that integrating technology will enhance their courses and communicate complex ideas to students more effectively, but they simply don't have the time to revamp their courses to accommodate the use of technology. Effective instructional technology takes time to develop and the demands on a faculty member's time does not allow for hours of development.

When planning the first master classrooms in 1993, a decision was made to allocate some of the funding for the project to faculty release-time and summer-pay grants. An academic committee was formed, grant guidelines were written, and the first grants were awarded. Since 1994, fifty MTSU faculty members have received either three credit hour release time or summer pay grants. These grants give them time to rethink their curriculum and develop technology-based instructional tools for use in the classroom.

Many innovative projects have been completed by faculty receiving grants. A sampling includes: utilization of authoring software to develop presentations that illustrate trauma situations to nursing students, creation of an interactive tutorial for

use in an art orientation course, preparation of an algebra tutorial for use in the classroom and the lab, and development of multimedia materials including digitized video and sound to present the characteristics of children with disabilities to education students.

Recognition

Incentives and encouragement ensure the effective widespread and long-term use of instructional technology by faculty and recognize the value of instructional improvement.

OIT's bi-monthly newsletter recognizes the accomplishments of MTSU faculty in the area of instructional technology use and development. Other campus publications also feature articles about faculty's use of technology-based teaching tools. Many of the MTSU faculty who have developed multimedia applications and incorporated them into their classes have presented their achievements at conferences.

At the beginning of this year, the MTSU Foundation funded an annual award for outstanding achievement in the use and development of instructional technology. The award features a cash allotment of \$1,500 as well as recognition of the value of the faculty member's work in the area of instructional improvement.

Conclusion

MTSU has made great strides in the past few years in its efforts to encourage and support instructional technology use by its faculty. In addition to the current methods of providing awareness, access, training, support, time, and recognition for faculty that are using instructional technologies in their teaching, there are other ways that MTSU can continue to assist faculty in their instructional technology endeavors.

Future plans for instructional technology at MTSU include: continuing to construct more master classrooms on campus, expanding the campus network, adding to the inventory of check-out equipment, increasing the time and support available to grant recipients, continuing to expand workshop offerings, developing a comprehensive WWW page of instructional technology resources, offering more comprehensive application support through the use of additional staff, highlighting grant recipients' accomplishments on OIT's WWW pages, and continually exploring new avenues for recognition.

As we move into the future, the constant challenge will be to continue to encourage new and mainstream faculty to integrate technology into their teaching while providing existing instructional technology users with an even more advanced level of support. MTSU welcomes the challenge and looks forward to the possibilities that advances in instructional technology can provide for our faculty.



Track Sessions



Track 5: Technology-based Facilities



Mid-South Instructional Technology Conference



TITLE: Teaching From the Desktop

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ABSTRACT:

MTSU began offering courses by desktop videoconference (DVC) in Fall 1995 and continues to experiment with ways to use this very new and flexible teaching tool. The goal of this demonstration is to expose educators to this new technology and its many possibilities, and to stimulate discussion and the exchange of information on desktop videoconferencing as a teaching tool. The possibilities are not yet explored for its potential in individual as well as group instruction, for synchronous and asynchronous contact, and for its incorporation with other technologies to provide an environment for distance students that is not only convenient, but that holds all the benefits of a classroom experience.

Teaching From the Desktop

You are sitting in your office at your computer writing a paper when, bip-bip, bip-bip, your organizer alerts you that it is time for your ten o'clock class. The pattering on the pane of your postage-stamp window tells you that its raining buckets. And you forgot your umbrella this morning. But you don't need an umbrella. You don't even need to get up. You simply save the paper you are working on, aim your mouse at an icon, and click. The screen looks like a telephone handset. You select a name from the dial list, click on "dial." It rings and there, if she hasn't decided to cut class today, is your student. After exchanging greetings you launch the application you will both be working in today and class begins. This is not the future. This is desktop video conferencing at MTSU today.

Desktop video conferencing (DVC) is teleconferencing over a desktop computer. A DVC system consists of a video camera, a video board, software, a headset with speaker and microphone, and either network or ISDN interface¹ installed on a high-speed computer, with 16 MB of RAM, a VGA or multi-media monitor, and Windows 3.1 or better. There are about 60 DVC systems on the market today² which range in price from around \$2,000 to around \$6,000 not including the cost of the computer.³ Substantial educational discounts are available for some systems.

MTSU began using DVC for individualized instruction in the Fall semester of 1995. Watson Hannah taught Accounting 300 to two students located about twenty miles from MTSU's campus. Each student met at regularly scheduled times on a DVC system in a classroom at the Nissan Training Center. Ms. Hannah instructed from a DVC system in her office on MTSU's campus. The teacher and student called one another on their computers over ISDN telephone lines.⁴

MTSU chose Intel's ProShare Personal Conferencing Video System to begin its experiment into "Teaching from the Desktop" because of the flexibility the product offers through document and application sharing. The integration of data sharing and collaboration tools with video conferencing was the trick that finally made DVC attractive to education. Without data sharing the DVC is little more than a videophone. Although it is possible to deliver a course entirely over a videophone, just as it is possible to deliver a course over a telephone, interaction between student and teacher would be limited and the sharing of information would be difficult. New DVC systems increase interactivity with a broad range of collaboration tools. Teaching with these tools is like teaching in a mini-multi-media classroom.

¹ DVCs on networks can only call other DVCs on that network. Those with ISDN connectivity can call any other video conferencing system that is also connected to ISDN lines.

² p. 114. "Teleconferencing Directory Issue" *Teleconference: The Business Communications Magazine*, Vol 14, No. 4, 1995.

³ p. 60. "Desktop Videoconferencing Challenge." *Newmedia*, Nov. 1995.

⁴ Integrated Services Digital Network (ISDN) is a set of standards that allows video, voice, and data to be transmitted over specially configured telephone lines.

On the white board a teacher can type out ideas, outline the course work, show pictures, graphs, etc. to illustrate a point. The teacher can then ask for input from the students who can add notes and make changes on the white board with highlighter, pen, circle or other annotation tools. Students and teachers can assume different colors to distinguish their notes, but the teacher always has control. The teacher can choose either to share the board with the student or to lock the student out. Teachers and students also have private workspaces for note taking which only they can see.

With document sharing the teacher can present information to students on screen. No need for handouts. If necessary the student can print out the information or save it to a disk. Students can present their assignments to the teacher on screen. The teacher can make corrections with any of the annotation tools.

Through application sharing the teacher can present a document and change it in its original application. The changes can then be saved to the original application. Any Windows-based application, e.g., spread sheet such as Lotus, Excel, QuatroPro; word processor such as Word or Word Perfect; data base such as dBase, or Access; desk-top publishing such as PageMaker or Publisher; even presentation applications such as Astound or PowerPoint can be shared. The teacher can share the application with students even if students' PCs do not have that application.

Some of the advantages to teaching from the desktop are obvious. The student can finish a shift at work and go directly to class without going home or driving several miles. The student can not only see and hear the instructor but can interact with her on screen in real time. The instructor can teach from her office having, literally at her fingers, all of the resources she needs.

The purpose of this year's experiment was to determine what the disadvantages might be. One expected disadvantage turned out not to be a problem at all. We expected students and teacher to have some initial difficulty learning to use the DVC system. The two students in this experimental class used computers in their work and so found the ProShare system very easy to learn. Likewise, the teacher was already a skilled computer user and had little trouble learning to the wide range of collaboration techniques available to her.

There were some technical problems in the beginning largely due to miscommunication and the inexperience of technical personnel with this very new system. By the end of the semester, although technical problems were not totally eliminated, they were dealt with more efficiently. Locating the right person to handle the problems and a spirit of cooperation were both important in working out these problems.

Technology can cause a lot of changes, but it will never change human nature. Students still tend to cut class from time to time and when there is only one student, class cannot continue. This put the course behind schedule. The instructor imposed penalties to limit missed classes.

Despite all the tools available on ProShare they are sometimes not enough. Although the accounting class did not lack any tools, another teacher interested in offering an electrical engineering course found that he could not express the necessary equations with the available tools and that the handwriting tablet available to ProShare was too small to use comfortably. We are searching for a larger electronic tablet.

The most significant limitation to this system is its inability to teach more than one student at a time. This is too inefficient to be useful except on an experimental or an emergency basis. In 1996 MTSU plans to initiate group participation in desktop video conferencing. Classrooms of DVC equipped computers at remote sites perhaps at another college, a high school, or a business will be networked. Another networked DVC classroom will be located on campus. The instructor will be able to teach multiple remote networks from the on-campus classroom in much the same way that compressed video classes are taught.

This DVC classroom will supplement MTSU's existing compressed video distance learning classrooms. Compressed video will continue to be used at sites that enroll large classes of students. DVC classrooms will be designed to serve areas that consistently have low enrollment. Equipping low enrollment sites with individual DVC systems will be considerably less expensive than equipping those sites with room sized teleconferencing systems.

A new product called The Presenter, released by Intel in January, 1996, may make this possible. With this product a teacher can send video, audio and data to unlimited numbers of students. Students can respond to the teacher either by voice or keyboard. Each student can choose to interact privately with the teacher or with the entire class. If The Presenter will make video conferencing affordable for small groups of scattered students it may be the tool that MTSU needs to reach more students at a distance.

Other possibilities for using desktop video conferencings in asynchronous contact and for its incorporation with other technologies remain to be explored. MTSU will continue to lead the search for technology that will offer more students a learning experience that is not only convenient, but that holds all the benefits of a classroom experience.

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INSTRUCTIONAL LABS: PLUSES AND MINUSES

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Abstract

As we approach the year 2000, we know that many external factors will influence our classrooms. Several questions are of concern for every teacher or educator: Do we have a vision of what classrooms may look like in year 2000? Are our computer labs becoming instructional labs? Are teachers ready to teach in instructional labs? Are our labs well equipped with instructional technology? Is design of computer lab important? This paper tries to explore answer for these questions and presents a strategic plan for an instructional lab, where new technology complements the instructional models of teachers.

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Introduction:

As we approach the year 2000, we know that many external factors will influence our classrooms. Several questions are of concern for every teacher or educator: Do we have a vision of what classrooms may look like in year 2000? Are our computer labs becoming instructional labs? Are teachers ready to teach in instructional labs? How much computer knowledge is enough? Are our labs well equipped with instructional technology? Is there a difference between future classroom and instructional labs? Can all computer labs be converted in instructional lab? How to allocate computer resources within our schools? How does computer labs meet the instructional styles of the teachers? Is design of computer lab important?

This paper tries to explore answer for these questions and presents a strategic plan for an instructional lab, where new technology complements the instructional models of teachers. The paper also identifies the problems relating to design, costs and procedures of the lab.

Do we have a vision of what schools may look like in Year 2000?

Imagine a classroom with full of computers, where students are looking at the monitor screen. They see worlds within worlds, resizeble windows into reality, layers of knowledge, images, symbols, animations and 3D mathematical models. Perhaps, these worlds, layers, and windows-will be displayed on a tile-like mosaic of flat screen monitor "pasted" on the wall or on screen. They are thinking the ways to get through this wall or screen. Imagine another classroom in which students in groups take charge of the classroom, by becoming multimedia authors, creating quicktime movies, desktop publisher, creating slide presentation of Science and math. Both classrooms are the example of future classroom, where information will be accessed, processed, displayed, demonstrated and communicated through multimedia.

What does it say to us "The future is not what it used to be!" stated a well-known educator several years ago. It certainly isn't. Changes are occurring at an unprecedented rate. We have entered the information age, post-industrial society, the communication era. We are bombard daily by changing values, life styles, relationships, products and emerging technologies. Yesterday science fiction is rapidly becoming reality. Electric cars, notebook-size computers and smart appliances are no longer dreams. World wide interactive communication links that simultaneously transmit audio, video, and hard copy are already in place. And world's knowledge base is growing at exponential rate.

Today's information society requires people with different skills, must be able to communicate, problem-solve, use a variety of strategies to access and analyze information and be able to work in a group situation. They must also be able to use the tools relevant to the Information Society and not simply view these tools as objects of study. Old paradigms are disappearing and new paradigms are emerging.

New Emerging Paradigms

New paradigm are emerging in education, technology, classroom environment and culture of the classroom. In education, visual literacy is replacing textual literacy. Learner-based teaching is going to be the norm. In technology, digital video is going to be used as multimedia. Two-way interactive learning is getting popular and becoming common. Classroom environment is changing towards interactive teaching and learning. Culture of the classroom is changing to be multicultural. Diversity in classroom is creating new challenges for the teachers. What does this mean for teachers and educators? This means to shift the teaching and learning from the relevant to an industrial age to the information age of today. We must integrate these information tools into everyday classroom activities so that our students will view and use them as productivity instruments. Two models of classrooms have emerged as a result of information age: (1) Master Classroom and (2) Computer Classrooms.

Master Classroom

Master classroom is defined as the classroom which provides full range of technological support, media, computer and network. In other words master classroom provides a bridge between analog and digital world. Master classroom is a teacher-centered facility, which is supported by Integrated control system.

Computers Classroom/Instructional Labs

Computers Classroom, (from now on I will refer instructional lab) is defined

as a facility, where modes of instruction are learner-centered teaching, individualized learning, collaborative activities, interactive learning, presentations and demonstration. To really work, these technology-enriched instructional labs of the 1990s must empower the student and teacher to learn and to explore in many directions. Learning-centered classroom, where teacher is free to use whatever material and methods is most appropriate. Regular classrooms are becoming the basic setting for the use of digital technologies. Now, with more and more computers in the regular classroom, teachers, groups of students, and individual learners can use the computer when needed-even if is just a few minutes. In other words, classes are held in computer labs, which in turn are becoming instructional labs.

Instructional labs consists of varied number of students stations, and one instructor station. Every work station is equipped with multimedia technology. Every lab is equipped with video card, color scanner, laser printer, image writer, projection screen and LCD panel. These labs are equipped with most current software. If teaching in a computer labs is same as teaching in instructional labs, any lab can be converted to instructional lab. But open labs are different from instructional labs in their requirement, utilization and diverse group of learners. There are some pluses and minuses of using these Instructional Labs. Pluses can be determined by the utilization of these labs to the fullest, and minuses will be determined by the user's needs and operation criteria.

Instructional Lab: Pluses

Students like to be taught in these classrooms/labs. There are three basic advantages of using these instructional labs from the point of view of learner, which can be best described in the following children' rhyme¹,

"No More Lectures
No More Books
No More teacher's Dirty looks."

No More Lectures: There will be less lecture, more participation. Teacher is acting as mentor. Most of the assignments are on contract basis, student learn at their own pace. Teacher is there to coach them, or act as a facilitators. More classroom activities, more hands on experience. Collaborative learning is quite common in these classes.

No More Books: Books are there but are replacing with electronic books i.e. bookware. High usage of desktop publishing. Interactive text, global experience through network.

No more Teacher's Dirty looks: Climate will be improved, diverse projects based on gender/race/cultural issues. Diversity learning through global access.

From the point of view of an instructor, the method of instruction consist of mini lectures, team teaching, group ware continuous evaluation, electronic collaboration, global information access, bookware, and improved classroom climate with diverse teaching and learning styles. Teaching in these labs will provide a unique experience for teachers, where teachers and students learn and explore together the real world of knowledge.

Instructional Lab: Minuses

Most common problems in these instructional labs are related to hardware problem, software problems and management problems.

Hardware Problem: Most common problem is lack of memory on hard drive, work can not be saved, sound can't be played, scanned pictures can not be displayed etc. etc.

Software Problems: Software is getting obsolete, upgrading of software is cost limited , and new virus protection needed. etc. etc.

Lab management Problem: Lab monitor , security, and operational problem.

Pluses and minuses of instructional lab depends on the full utilization of these computer classrooms/instructional labs. Suppose we have two Computer classrooms/instructional lab with 12 student stations and one instructor station, equipped with multimedia technology in a school setting. Are these labs utilized to the full potential. Are our teachers ready to teach in these labs? How much computer knowledge is enough to teach in these labs?. Do these labs meet the instructional styles of teachers. Is Design of the lab important? Arranging computers in a lab setting makes sense only if the teaching styles of the teachers in school make it easy for them to take advantage of the lab. The question arises how well do these model match the instructional styles of teachers who are supposed to be benefiting from them. A good instructional lab is the one where new technologies complement the instructional model of teachers. To run successfully these technology-enriched classrooms, computer proficiency of teachers and design of the instructional lab are the two most important variables.

1. Teacher's Computer Proficiency:

How much teachers should know about computers to teach in instructional labs. Should they be computer programmer, or computer literate. According to International Society for Technology² in Education's curriculum guidelines following skills are important to teach in computerized classrooms:

- Teachers must demonstrate ability to operate a computer system in order to successfully utilize software; the use of computer-based system should become the second nature for teachers.
- Must be able to evaluate and use computers and other related technologies to support the instructional process.
- Use computer-based technologies to access information to enhance personal and professional productivity.
- Apply computers and related technologies to facilitate emerging roles of learners and the educator.
- Demonstrate knowledge of uses of multimedia, hypermedia, and telecommunication to support instruction.

2. Design of the Instructional lab

Design of a good instructional lab does not consist only outlay of the room or hardware and software, and cost of lab, but also addresses the "soft issues", like, teachers' needs, learner needs, ergonomics, health of the users, management of lab, and operation of lab.

a. Layout

The layout of the lab will vary depending on the size and configuration of the room. Any layout should be carefully thought through to make most of the conditions.

b. Instructional Needs vs Lab Requirements

Lab requirements are that microcomputers are easy to use, information display will be effective, and teacher's control system will be effectively devised.

c. Computer Issues

Reliability of the lab in terms of equipment is important. Lab should be reliable in meeting the needs of instructor and learner. Proper hardware and software are to be installed.

d. Hardware and Software Selection

Always select the hardware you can support. If limited budget is the factor then use the simple software. Buying computers is not difficult, maintenance and repair costs more. If you decide to use multimedia in your labs, think twice. Always select integrated or preconfigured multimedia system. Always select what you can support. Software selection will meet the instructor needs and learner needs. Training should be provided to the teachers. Reliable virus protection software to be selected.

Selecting hardware and software for instructional labs should be carefully planned. In selecting hardware, it is always good to take advice from computer specialist. How many computers are ideal for class. Decision to buy

the computers should be taken after the needs analysis of teachers, and other users. Usually the decision is taken by vendor or administrators, who hardly use that classroom. There should always a support person to help the lab monitor in case of hardware problems. Selection of software will be determined by the needs of teachers and students.

e. Media

Labs will need to be equipped with Multimedia computers, projection screen, LCD (Liquid Crystal Display), video/data projector, LCD projection panel, or overhead projector. Video/data projector may be permanently suspended from the ceiling. No visible hanging wires from the computers should be allowed in lab.

f. Management of Instructional Lab

A good design will incorporate a "Management plan" for the lab, which includes constant monitoring of lab, lab procedure, labs scheduling. Lab will be monitored before the classes and after the classes. Before classes it is important to see that all computers are working, after classes to trash the unnecessary files. To save time loading of software can be done through file share from one computer to other computers. Procedures and labs schedules of the labs can be put on computers, so that students can access from any place on the campus. Procedures can be posted on doors or walls. No drinks and food to be allowed in the instructional labs.

f. Security of hardware and software

When planning and selecting hardware, security measures for the lab must be carefully evaluated, purchased, and installed. Windows, doors, false ceilings, and HVAC ducts should be fitted with electronic alarms. Lab monitors and consultants should also be responsible for attending to security.

For software security, the lab should be equipped with virus detection and disinfectant applications and consultant make sure that all users submit their disks for examination. Lab hard disk should be checked regularly for virus, illegal copies of applications, excessively large and costly files.

g. Cost of the instructional lab

Cost is the limiting factor in developing an ideal instructional lab. With new technologies and advancement of software, software and hardware become obsolete. To upgrade the technology in these labs take long time, because of shortage of funds.

h. Computer and Health:

One of the most neglected issue in designing an instructional lab is safety , health of the user. Information about the threat that computers present to health is important for all those involved in education-administrators, teachers, and students. Obviously, administrators and teachers need to know because they control how the technology is set up and used. But students should also be taught correct use of technology because they will be using it throughout their working lives. These issues are being discussed more and more in the media as we become aware of cumulative effects of long term exposure to, or use of, the machinery. Health issues are especially significant. Computer and related electronic system can cause debilitating, Extremely low Frequency(ELF) Emissions, Carpel Tunnel Syndrome (CTS) and some time life -threatening illness when used incorrectly. In designing a lab these health issues are significant.

In order to avoid ELF emissions and safety the following recommendation should be implemented in any school, home, or office computing environment:

- Position computer monitors so that user can sit at least an adult arm's length (two to three feet) from the screen.
- Maintain similarly adequate distance from the sides and back of the other adjacent computing machines.
- The standard recommended depth for computer tables is 30 inches (Apple Computer³).

i. Ergonomics

A good design always takes into consideration Ergonomics. Ergonomics (Human factors engineering) is "an applied science that coordinates the design of devices, systems, and physical working conditions with the capacities and requirements of the worker." (Webster's, 1991). Ideal situation is for one to avoid the injury in the first place, and this is possible with the application of elementary ergonomics adjustments to furniture and to one's work routines. Examples are: take a break, support the wrist, share jobs, keep work habits flexible and varied and create the right ambience: from lighting to noise, colors, wall coverings, and space.

Lighting should be subdued and localized so as to cut down on eyestrain and headache-inducing glare from the computer screen. The computer screen should be tilted if necessary in order to reduce glare. Noise should be muted by sound-absorbing floor, wall, and ceiling materials. Colors of walls and ceilings should be neutral(light pastel shades). All surfaces should be nonreflective.

The more space for movement around a classroom the better. This reduces stress, both physically and psychologically. People also work better when they have room to breathe. Usually, very little consideration is given to how to optimize the space in a room so that open space is maximized. It is surprising how much space can be gained through careful placement of furniture. The simplest technique is to use scaled-down, cut-out shapes of all the furniture that will go into the room. Then, on a similarly scaled down floor plan, try any number of options until the maximum amount of open space is made available. Applying this idea will help avoid stereotypical layouts. A nice team-building idea is to make a competition out of designing the best layouts for the classrooms or computer labs. An ideal design can use the following recommendations, some which are adapted from Pool.⁵

Recommendations :

- Provide chairs that can be adjusted for heights so that user can position the computer monitor at, or slightly below, eye level. This encourages user to hold the head in a comfortable upright position, thus taking pressure off the neck and upper back.
- The chairs should also have adjustable back rests to support the lower and middle back.
- If possible, set the controls of computer screens so that the background color is white. This reduces eye strain.
- Tilt the screen (with wedges if necessary) to cut glare from light sources, natural or otherwise.
- Computer keyboards should be detachable so that the user can sit back from the monitor and as adjust the orientation of the keyboard for maximum comfort.
- Keyboard should also be adjustable for height to fit the position of the wrist, which will vary from person to person.
- Use tables that are deep enough to allow the user to be at least an adult arm's length from the computer monitor. This reduces the risk of side effects from EFL emissions.
- The table should be large enough to provide adequate work space for writing and other activities.
- Use nonreflective and sound proofed materials for all surfaces in the room to cut down on other activities.
- Use neutral colors for surfaces and equipment to create a restful ambience for the eyes.
- Use ergonomics when setting up standard computer equipment (footprint of the computer system, keyboard)
- Select or adapt furniture to fit the user

Summary

Today's utilization of instructional labs depends on team work among teachers, learners, technology experts and administration. Appropriate training of teachers, and well designed multimedia instructional lab environment will prepare the teachers for future computer classrooms. Design of lab is important, but the most important is the user of the facility, their needs, their learning and teaching styles. But the key is "The Vision" created and shared by teachers, administrators, and technical support group for a future learning.

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The Instructional Technology Support Center at MTSU: Integrating Technology into K-12 and University Classrooms

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ABSTRACT

The Instructional Technology Support Center (ITSC) provides training and support for the use of instructional technology by K-12 teachers and MTSU faculty. The ITSC consists of Media Services, Engineering and Technical Services, a multimedia development center, and three computer classrooms. Media Services houses an extensive multimedia library. Engineering and Technical Services provides audio-visual equipment and produces original videos. The multimedia development center helps faculty create multimedia projects. The computer classrooms are used for teaching courses in the teacher preparation program; for instructional technology training; and to provide access to computers for MTSU students and faculty. Recent ITSC initiatives are summarized.

Introduction

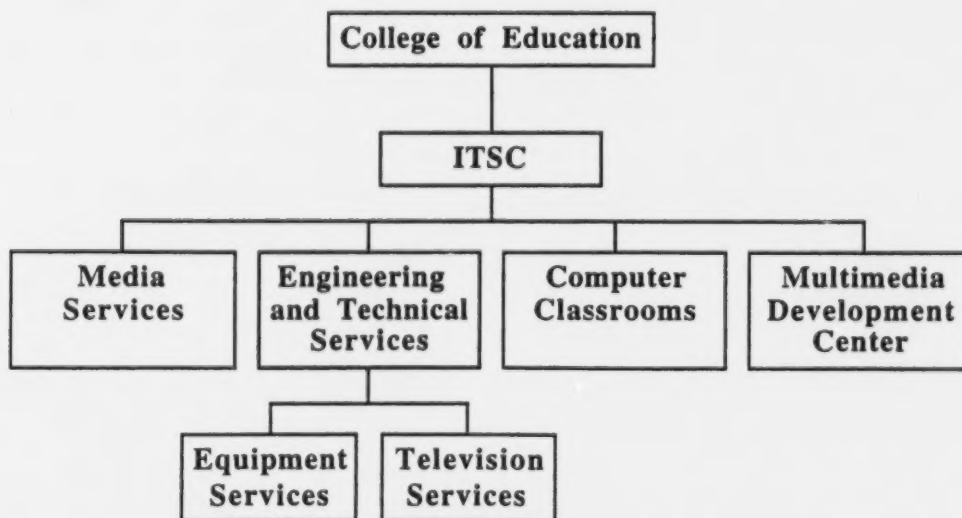
The Instructional Technology Support Center (ITSC) was established in 1994 to provide training and support for the use of instructional technology by K-12 teachers and Middle Tennessee State University (MTSU) faculty. Below, the history, administrative structure, facilities, hardware, software, goals and recent initiatives of the ITSC will be described.

History

The MTSU Learning Resource Center (LRC) was built in 1975 to support teaching and learning by using the cutting-edge instructional technology at the time - video and television. The LRC's main objective was to provide faculty and students with a wide range of innovative and effective teaching and learning options. The Instructional Technology Support Center, located in the recently renamed Ned McWherter Learning Resources Center, was established in 1994 to provide training and support for the use of instructional technology by K-12 teachers and MTSU faculty. Instructional technology in the 1990's includes computer hardware and software, laserdiscs, CD-ROM, multimedia, Internet resources, hypermedia and other emerging technologies.

Administrative Structure

The Instructional Technology Support Center (ITSC) consists of the following units and facilities: Media Services, Engineering and Technical Services, two computer classrooms, a twenty-first century classroom, and a faculty multimedia development center. The administrative structure is represented graphically below.



Media Services

Media Services houses an extensive multimedia library, a teleconferencing classroom, and a multimedia classroom. These facilities are described below.

Learning Lab

- houses a collection of video/audio cassette tapes, 16mm films, 35mm filmstrips, laserdiscs, computer software, and CD-ROM's available for faculty loan and in-house student use
- offers a software/CD-ROM reserves service for faculty and students
- provides computers, typewriters, and various projectors to faculty and students for in-house use.

Teleconferencing Classroom

- accommodates approximately thirty participants for audiovisual viewing and/or teleconferencing.
- furnishes a video projector and projection screen, VCR and laserdisc player, various audiovisual projectors, and an electronic white board for classes or meetings.
- has a Power Macintosh 7100 with CD-ROM.
- has an LCD panel and overhead projector compatible with Macintosh & Windows platforms.

Multimedia Classroom

- theater-type classroom with large-screen projection of videos, slides, 16mm films, overhead transparencies, and television programs.
- allows instructor control of room lights, sound recordings, and projector from a console at the front.
- has a Power Macintosh 7200 with CD-ROM.
- has a data/video projector available for check-out through Equipment Services.

Engineering and Technical Services

Engineering and Technical Services consists of two sub-units: Equipment Services and Television Services. The Equipment Services sub-unit supports faculty use of audio-visual equipment by providing check-out service and repairing campus audiovisual equipment. The Television Services sub-unit helps faculty members and administrators create high-quality videos to enhance their teaching and presentations. Both sub-units are described in more detail below:

Equipment Services

The Equipment Services sub-unit supports faculty use of audio-visual equipment through the following:

- maintains an inventory of audio-visual equipment for faculty/staff check-out.
- repairs campus audiovisual equipment.
- provides dubbing services including videotape format change and limited multiple copying.
- records off-air programming for classroom use.
- supports satellite down-linking for classroom use, teleconferencing, or videotaping.

Television Services

The Television Services sub-unit helps faculty members and administrators create high-quality videos to enhance their teaching and presentations through the following professional services:

- Studio Production - - a multiple camera, broadcast-quality facility to videotape lectures, classes, talk shows and performances.
- Remote Production - - a single camera, broadcast-quality videotaping service for on- or off-campus locations such as classrooms, offices, sporting events, or conferences.
- Graphics Generation - - a method of adding words, titles, credits, transitions, and special effects to video during editing.
- Post Production - - editing footage into a cohesive video presentation.

Computer Classrooms

The computer labs and twenty-first century classroom are used for teaching technology and methods courses in the teacher preparation program; for instructional technology training; and to provide access to computers for MTSU students and faculty. All computers in the computer labs and the twenty-first Century Classroom are connected to the campus network which provides access to Internet. When classes are not in session, the computer labs are available to MTSU faculty and students for open lab hours and special programs. During open-lab times, student workers are available to provide technical assistance. The hardware and software contained in each of the computer classrooms are described in detail below.

Power Macintosh Lab

- 25 Power Macintosh 7100 computers w/ CD-ROM.
- Laserdisc player and VCR.
- 4 large-screen display monitors.
- 1 color flatbed scanner and 2 laser printers.
- software: word-processing, spreadsheet, database, presentation graphics, multimedia, authoring, and Internet applications.

Pentium Lab

- 25 Pentium computers w/ CD-ROM.
- Laserdisc player and VCR.
- 4 large-screen display monitors.
- 1 color flatbed scanner and 2 laser printers.
- software: word-processing, spreadsheet, database, presentation graphics, multimedia, authoring, and Internet applications.

Twenty-First Century Classroom

- 1 Power Macintosh 7100 teacher workstation w/ CD-ROM.
- 16 Power Macintosh 6100 AV student workstations w/ CD-ROM.
- LCD panel and overhead projector.
- 1 laser printer.
- software: word processing, presentation graphics, database, spreadsheet, and Internet applications.

Faculty Multimedia Development Center

The faculty multimedia development center provides hardware, software, and technical support for creating multimedia instructional materials for use in teaching. Faculty may sign up for 2-hour blocks of time to create multimedia presentations, hypermedia modules, and other technology-based materials for enhancing classroom instruction.

Hardware

- Power Macintosh 8100 with CD-ROM.
- laserdisc player, digital VCR, and monitor.
- Pinnacle CD-recorder.
- color flatbed scanner.

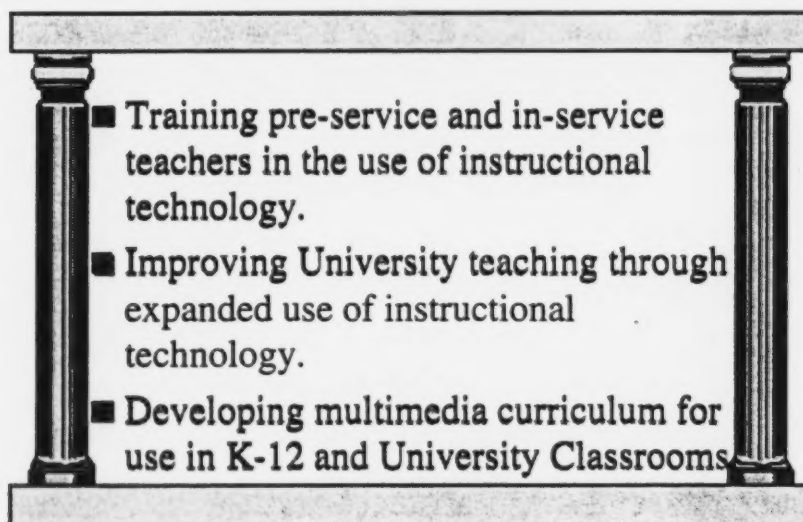
Software

- productivity Software.
- presentation Graphics Programs.
- multimedia Development Programs.
- authoring Tools.

Center Goals

The Instructional Technology Support Center was established to fulfill three primary goals. These goals are summarized in the graphic below.

Goals of the ITSC



Recent Initiatives at the ITSC

Progress has already been made toward meeting the three primary goals of the ITSC. This progress is summarized below for each goal.

Training Pre-Service and In-Service K-12 Teachers in the Use of Instructional Technology

A primary mission of the Instructional Technology Support Center is to provide technology training and support for pre-service and in-service teachers. The ITSC cooperates extensively with the departments of Educational Leadership and

Elementary and Special Education to provide instructional technology training to students in MTSU's teacher education programs. Faculty from these departments teach technology-related courses in two computer labs (Power Macintosh lab and Pentium lab). Educational methods courses are taught in a twenty-first century classroom that is an expanded version of technology-rich classrooms found in Tennessee's public schools.

The ITSC also collaborates with the two teacher education departments, other university units, area schools, the Tennessee Board of Regents, and the Tennessee Department of Education to provide in-service training for K-12 teachers, administrators, and staff. Recent initiatives include a series of in-service workshops introducing Middle Tennessee teachers to presentation software packages, multimedia teaching tools and strategies, Internet, and student databases.

A summary of recent initiatives meeting the instructional technology needs of K-12 pre-service and in-service teachers appears below:

- educational technology courses for pre-service teachers.
- educational methods classes for pre-service teachers offered in a technology-enriched (twenty-first century) classroom.
- Internet training for K-12 teachers.
- Internet training for K-12 librarians.
- in-service technology workshops for Tennessee teachers.
- host for the annual Tennessee Technology Coordinators Conference.
- conference programs and facilities.
- week-long summer multimedia workshops for K-12 teachers.

Improving University Teaching through Expanded Use of Instructional Technology

In addition, the ITSC has assisted faculty in integrating instructional technology into University teaching. The center organizes faculty workshops, demonstrations, and training sessions relating to the use of instructional technology in the academic disciplines. For example, a faculty instructional technology institute is offered each summer. At the institute, faculty attend hands-on training workshops and share their experiences using instructional technology in the classroom.

The ITSC also participates in the Teaching, Learning, and Technology Roundtable (TLT-R) program which is sponsored by the American Association of Higher Education. The MTSU TLT-R consists of faculty and administrators committed to improving teaching and learning through selective use of new technology. The campus TLT-R program is developing a technology experts list

which will be available on-line for use by MTSU faculty. Further, the TLT-R was instrumental in establishing a new faculty award for innovative use of instructional technology in teaching.

Developing Multimedia Curriculum for Use in K-12 and University Classrooms

The ITSC has made initial progress toward meeting its third primary goal, that of developing multimedia curriculum for use in K-12 and University classrooms. The ITSC regularly offers workshops focusing on multimedia teaching tools and strategies for K-12 classrooms. Further, the ITSC and the Department of Educational Leadership are co-sponsoring a new instructional technology initiative for K-12 teachers called "M.A.S.T.E.R. I.T." (Math and Science Teachers Expanding Resources through Instructional Technology). M.A.S.T.E.R. I.T. is a week-long workshop for secondary math and science teachers focusing on the development of multimedia instructional materials. A team approach to multimedia development is adopted in the program. Teachers work with curriculum experts, MTSU faculty in their content areas, and center technical specialists to create multimedia curriculum to be used in their classrooms.

Progress has also been made in helping faculty create multimedia curriculum for use in University classrooms. The ITSC houses a multimedia development center where MTSU faculty can create multimedia lectures or presentations. The center is in the process of hiring a full-time instructional technology specialist who will consult one-on-one with faculty using the multimedia development center. Center multimedia services will include production of original video through the Television Services unit, digitization of video, production of CD-ROM's, and addition of animation, video, sound and graphics to multimedia projects.

Summary

Although the Instructional Technology Support Center has been in existence for less than two years, considerable progress has been made toward meeting its primary goals. Through its component units and facilities - - Media Services, Engineering and Technical Services, the center's computer classrooms, and the faculty multimedia development center - - the ITSC strives to meet the instructional technology needs of K-12 teachers and MTSU faculty.

Master Classrooms at Middle Tennessee State University: Creating Pathways for Learning

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Students and faculty at MTSU are exploring new ways of teaching and learning in master classrooms. Master classrooms are specially equipped classrooms that contain a wide range of computer, media, projection, communication, and control capabilities; including connection to the campus network. Master classrooms typically contain one computer which can be used by instructors and students for presentations, simulations, on-line access and multimedia.

This paper contains information on the development and implementation of master classrooms. Topics include planning for rooms, renovating and developing rooms, purchasing equipment, utilizing the rooms, training and supporting faculty, maintaining and upgrading equipment, conducting evaluations and implementing suggestions, and planning for the future.

Master Classrooms at Middle Tennessee State University: Creating Pathways for Learning

Students and faculty at Middle Tennessee State University are exploring new ways of teaching and learning. Specially equipped classrooms, called "master classrooms" combine powerful computing, effective display, and the wealth of information available through networks to provide a more flexible and exciting learning environment that accommodates different teaching and learning styles. Studies show that students tend to retain more as well as learn faster if they see, hear, and interact during the learning process. Master classrooms help provide these pathways for learning.

What is a Master Classroom

Kathryn Conway from the University of North Carolina at Chapel Hill defines a master classroom as a specially-equipped classroom that provides a wide range of computer, media, projection, communication, and control capabilities, including connection to the campus network. The master classroom differs from a computer classroom in that it usually does not have individual computers for each student, but rather has a single computer that can be used by an instructor or students for presentations, simulations, on-line access, and multimedia.

Master Classroom Advantages

The most obvious advantage to using a master classroom is the availability of computer, media, and communication technologies. These technologies enable instructors to enhance their different teaching styles as well as to reach students with different learning styles. In a master classroom the equipment is permanently installed and is operated in a consistent manner from classroom to classroom.

Master Classrooms at MTSU

MTSU's Office of Information Technology (OIT) initiated the master classroom project on campus and directed its implementation and development. Planning of the first six master classrooms at MTSU proceeded with support from both administration and faculty. Funds were allocated for equipment, software, and room preparation, as well as for faculty training and grants. Master classroom committees were formed in each college of the University to work with OIT to identify the equipment and software that would best meet the college's needs, as well as to choose the location of the master classroom for that college.

Additional master classrooms continue to be developed with individual departments contributing to their design and funding. As of

January 1996, MTSU has eight master classrooms located throughout the campus with room capacities ranging from 30 - 110. The average cost of the equipment and room renovations has been \$30,000-\$35,000 per master classroom. OIT continues to administer and support the master classrooms and provides training for faculty, technical support, and maintenance.

Room Renovation and Development

Designing the master classrooms requires consideration of elements such as heating, cooling, power supply, lighting, acoustics, security, networking, furniture, fixtures, and equipment. The following alterations and enhancements are made to prepare classrooms to become MTSU master classrooms:

- dimmable lighting is added with controls near the instructor's station and door;
- chalkboards are replaced with whiteboards;
- power outlets are added;
- a projection panel or motorized projection screen is mounted on the front wall;
- walls are repaired and painted, floors are carpeted; and
- special furnishings are installed such as an instructor's station and equipment cabinet.

Master Classroom Equipment

MTSU's master classrooms contain a wide variety of audio/visual media for use by faculty and students. The typical room consists of the following basic equipment:

- A teacher's station in the front of the room that houses a multimedia PC or Power Macintosh. These computers are loaded with productivity, authoring, presentation and communications software and have access to the campus network and the Internet.
- A visual presenter is mounted on the desktop of the teacher's station. It is used to view documents, 3-dimensional objects, transparencies and slides.
- An equipment cabinet holds a laser disc player, videocassette recorder, and audio receiver.
- Signals from the visual sources are projected on a screen at the front of the room via a multiscan video/data projector.
- Television monitors and speakers are also mounted at the front of the room.
- Each of these components, along with the lighting system, are controlled by the faculty member through a single remote control.

In addition to this basic equipment, each room is customized to fit an individual department's needs.

Master Classroom Uses

The uses of a master classroom are limited only by the faculty's creativity. Faculty may use commercially developed instructional materials in the form of videotapes, laserdics, 35mm slides, computer diskettes, CD-ROMs, audio CDs, and audio cassettes. They can also develop materials themselves.

Many classroom applications can be derived from word processing, spreadsheet, statistical, database, presentation, and authoring software. An English professor may use a word processing package to demonstrate sentence structure, or an accounting professor may use spreadsheet software to show students how to calculate annuities. Presentation software can be used to organize and present lecture notes, which can easily be enhanced with templates, clip art, and symbols. A biology professor may use multimedia authoring software to create an application incorporating animation, still photos, and movies to demonstrate the stages of mitosis. Utilization of these programs enables faculty to spend class time facing the students rather than the chalkboard. It can also increase the lecture's organization and legibility.

Master Classrooms and Network Connections

Having access to MTSU's campus network and the Internet allows faculty to connect to a wealth of content-related information and to demonstrate networks for students. Within the campus network, faculty can demonstrate how to use e-mail, search for information in the campus library, or retrieve files from other computers on campus. They can demonstrate how to use network tools such as Telnet, FTP, Gopher, and the World Wide Web.

The instructional possibilities of the Internet are endless. Examples include an aerospace professor displaying for a weather class satellite images of the earth's atmosphere photographed only an hour or so before class; a political science instructor accessing the President's latest press conference; and a business law class analyzing and discussing up-to-date Supreme Court rulings pulled from the Internet.

Training and Support

Orientations are held every semester to introduce interested faculty members to the capabilities of the master classrooms. One-on-one sessions are recommended for faculty that are teaching in the rooms. During these one-on-one sessions, faculty are given the chance to operate the equipment and ask questions related to their particular needs in the master classroom.

After the semester begins support staff are available if faculty have a problem during a class or have questions about the capabilities of the room.

OIT also provides instructional technologies development grants, productivity, presentation, authoring, and communications software workshops; and application development assistance to make sure MTSU faculty have the necessary time, training, and support to learn to use software, develop applications, and use technology effectively in the master classrooms.

Maintenance and Upgrades

Weekly testing of all master classroom equipment insures its proper operation. Software and hardware are upgraded on an ongoing basis as new ways of doing things are discovered and new equipment is purchased. Faculty suggestions play a significant part in determining what upgrades are needed.

Evaluations

Giving faculty and students the opportunity to evaluate the master classrooms every semester enables them to let us know what works well for them and what doesn't. They also provide OIT with suggestions for improvements. The results are compiled and taken into consideration for training, maintenance, and upgrading of current master classrooms. And, suggestions are kept on file as reference material for the construction of new master classrooms.

As of Spring 1996, over 200 different faculty members have taught in master classrooms. The response has been overwhelmingly positive. 95% of the faculty that respond to evaluations want to teach in master classrooms again and would like to see more master classrooms constructed on campus. They provide OIT with excellent suggestions for classroom improvements and upgrades. Many of these have already been implemented.

Since the inception of master classrooms in Fall 1994, well over 500 students per semester have taken classes in them. Almost 85% of the students surveyed would like to take more classes in them and see more constructed on campus. They site the Internet access in the rooms and the increased visual presentation of course content as two of the main factors.

Master Classroom Challenges

As departments allocate funding for their own individual master classrooms, scheduling and maintenance difficulties increase. Currently there are master classrooms that are reserved for use only by specific departments and master classrooms that are open to all departments when space is

available. Whether a master classroom is for university wide use or department specific use, OIT provides as much support as the faculty need.

As the numbers of master classrooms increase, OIT will also face the challenge of not having enough personnel to support them. This problem may be addressed by hiring additional personnel or student workers to assist with master classroom support.

The most difficult challenge OIT faces is not having enough master classrooms on campus. As faculty members start teaching in the rooms and developing materials that in many cases can only be used in master classrooms, they want to be able to teach all their courses in master classrooms. Of course, this is not possible at this time. OIT's only course of action is to encourage individual departments and colleges to continue to develop master classrooms and to seek grant funding for the construction of campus wide master classrooms.

The Future of Master Classrooms

During the fall 1996 semester, OIT will assist a department with the implementation the first multimedia carts on campus. Three systems have been purchased that contain LCD projectors, Macintosh PowerBooks, visual presenters, VCRs, and CD-ROM players. This is a workable solution in rooms that are not large enough to be converted to master classrooms. Master classroom faculty and other faculty that are using teaching materials developed by master classroom faculty can use technology-based teaching materials with these "portable master classrooms".

In addition, two new master classrooms will be constructed over the summer bringing the total to ten classrooms on MTSU's campus. Master classrooms will be constructed in MTSU's new Business/Aerospace building and library building as well.

Perhaps in the future there won't be a need for the term "master classroom" on the MTSU campus because the standard classroom will be a master classroom. Until this happens, OIT's goal is to constantly improve and upgrade not only the hardware and software in the master classrooms, but also the ability of our faculty members to effectively use instructional technologies in their teaching and share this ability with their students.



Workshop



Mid-South Instructional Technology Conference



**How to Participate in a Slow Revolution:
The AAHE Teaching, Learning, and Technology Roundtable Program**

Steven W. Gilbert
Director, Technology Projects
American Association for Higher Education

ABSTRACT

The real basics of education remain unchanged: the interplay among a student, faculty, other students, and information plus reading, writing, and other technologies. However, the definitions and boundaries are changing. Higher education is undergoing a slow revolution as it is transformed by information technology. The most common strategy for integrating information technology into teaching and learning—that is, lurching forward in response to successive crises—is not the most effective strategy. The solution proposed by the American Association for Higher Education's Teaching, Learning, and Technology Roundtable (TLTR) program is communication, coordination, and collaboration. The defragmentation of planning, policies, and support services through TLT Roundtables enables individuals to work together for effective participation in this revolution.



Teaching, Learning, and Technology Roundtable (TLTR) Program

Steven W. Gilbert

Mid-South
Instructional Technology
Conference (MTSU/SMSU)
Murfreesboro, Tenn. -- April 2, 1996

HOW TO PARTICIPATE IN A SLOW REVOLUTION

Steven W. Gilbert

Director, Technology Projects
American Association for Higher Education

Introduction to the
AAHE Teaching,
Learning, and
Technology
Roundtable
Program



"The Slow Revolution
Speeds Up!"

Presentation Outline

- Basics, Changes
- Big Picture Problem & Solution
- Excerpts: Obstacles, Recommendations
- Introduction, Commercial AAHE TLTR
- Conclusion: Nightmares, Visions, & Beyond?

Why Bother?
Information Technology
Can be
the Excuse and the Means
for...

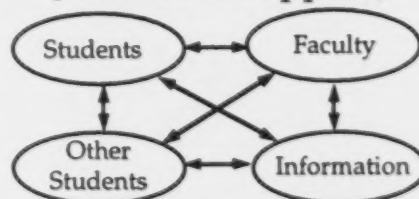
- Changing Education
- Changing Society
- For Better or Worse

Lessons about Education, Technology, and
Change from the 80s, 90s:

- Top-Down, Bottom-Up, and Infection
Don't Work *Separately*

- Can't Legislate Transformational Change, or New Paradigms *QUICKLY!*
- "Grass Roots" Alone Can't Build Adequate [Network] Infrastructure
- Infection Model Doesn't Work Without Receptive, Fertile Medium

Real Basics of Education [All Else is Support]

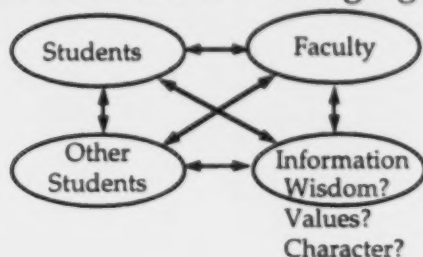


+Reading, Writing,
& Other Technologies



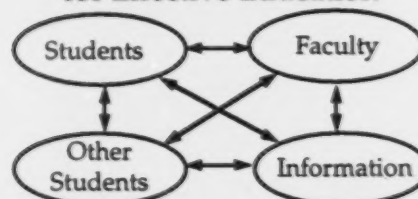
Teaching, Learning, and Technology Roundtable (TLTR) Program Steven W. Gilbert

The Definitions and Boundaries are Changing...



7

*Access to Information is Necessary
but NOT Sufficient
for Effective Education*

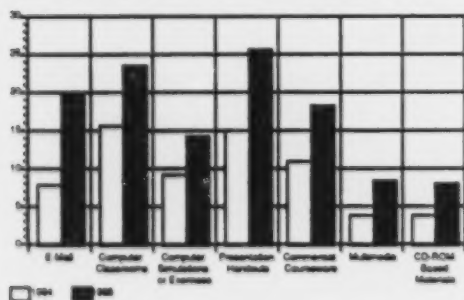


*Group Communication is Necessary but
NOT Sufficient
for Effective Education*

8

Using Technology in the Classroom

What A Difference a Year Makes!



10

Email in '90s
for Teaching/Learning
Like
Word Processing in '80s
for Personal Productivity

[Depends on Access to EMail for
Faculty & Students.]

TEST: Easy to send document?]

10

Other Infrastructure
(Hardware, Software,
Support Services) NOT
Growing Commensurately

Implications?

- Great Possibilities & Hopes
- Great Frustrations & Fears
- Support Services Key

11

Higher Education
Beginning 3rd Stage of
"Automation"

- Change Core Functions
 - Research
 - Operations
 - Teaching/Learning

12

BUT...

- The vast majority (75% $\pm$ 10%) of undergrad education is "traditional"
- Lectures, teachers leading discussion
- Students reading textbooks

13

Big Problem

- Higher Education Transformation
 - No Clear Vision
 - BIG, Multi-Dimensional, Uncertain
 - Information Technology Integral
 - Rising Fears and Hopes

14

Big Problem (cont.)

- Economic, Political Pressure
- Fragmentation -- Functional, Horizontal
- Separation -- Hierarchical, Vertical
- [Reward System]

15

Big Problem (cont.)

- Maximum Transition NOW
 - Entering 3rd Stage of Automation/Integration [See *Change* p. 16]
 - Support Service Crisis [See *Change* p. 19]
 - Expensive, Unpredictable
 - [Can Have Greatest Impact!]

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Solution & Recommendations for Avoiding the Most Common Strategy for Integrating Info Tech into Teaching and Learning:

- CRISIS
- LURCH
- CRISIS
- LURCH
- CRISIS
- LURCH

17

Big Solution: COMMUNICATION, COORDINATION, COLLABORATION [COMMUNITY]

- A Vision Worth Working Toward
- Inclusive Planning, Policymaking
- Portfolio of Change Strategies

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Big Solution (cont.)

- Support/Reward Pioneers, Mainstream, [Laggards?]
- Exchange Examples of Good Practice
- [Use Student Assistants]
- [Collaborative Learning, Teaching]

19

Big Solution (cont.)

- Better Financial Models
- Increased Investment
"During Transition"

20

Obstacles [Excerpts]

- Fragmentation: Planning, Policy Making, Support
- Distrust & poor communication among board, administrative leadership, faculty, staff.
"Will technology be used to reduce the faculty?"

21

Obstacles (cont.)

- Limited, uneven access to equipment, software, support services
- Lack of easily available info about "good practice"

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RECOMMENDATIONS
[Excerpts]

1. Keep Asking
Fundamental Questions
Through the Inevitable Transformation
of Education...

- What do you most want to gain?
-For yourself? For your institution?
- What do you most cherish and want not to lose?
- What are the remaining obstacles and how can you reduce them?

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CAUTION:
Be Careful about Replacing
Relationships
with
Transactions
[Bank Customer-Teller ≠
Student-Faculty]

25

1. Fundamental Questions (cont.)

- Which combinations of face-to-face meetings, independent work, and telecommunications are best... for what? How can information technology help most effectively?

26

8. ~~Avoid~~ Prepare for
Your
Support Service Crisis

27

It's not only *technical*
support!

- For more advanced, *deeper*, uses of information technology to improve teaching and learning...
- Need *combination of support services*: technical, library, faculty development, *et al.*

28

Things may get worse before
they get better!

- Expanding technology base
- Increasing faculty, student interest
- Hard to fund support staff
- INCREASING DEMAND,
DECREASING SUPPLY...

29

9. EXTEND STUDENT ROLES

- Use Students as Assistants

30



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10. PORTFOLIO OF CHANGE STRATEGIES

- Overall Institutional Strategy
- 2 Paradigms
[See *Change* pp. 8-9]
- Wide/Deep
[See *Change* pp. 20-21]

31

Overall Institutional Strategy

- Leader (Invest, Risk)
- Follower (20% Peers)
- Resister (Accept Inevitable)

32

2 Paradigms

- Balance or Collision of Paradigms? [Temporary?]
- Improve Institutional Productivity and Access

Vs.

Enhance, Change Teaching and Learning; Extend Content

- [See *Change Magazine* March/April 1996 pp. 8-9]

33

Improve Institutional Productivity and Access

- Reach wider, more diverse audience more efficiently
[Distance Education]
- Increase student access to specialized topics

34

Improve Institutional Productivity and Access (cont.)

- Increase capital investments;
Reduce operating costs
- [Increase student/faculty ratio]

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Enhance, Change Teaching and Learning; Extend Content

- Enable "deep learning,"
learning new content
- Increase quality, quantity of communication
[faculty-student & student-student]
[EMail, WWW]
- Increase faculty options for
designing, tailoring courses

36

Enhance, Change Teaching and Learning;
Extend Content (cont.)

- Find new revenues or cost-savings; Support increased operating costs, faculty workload, student workload
- [Decrease student/faculty ratio]

37

Productivity/Access
Vs.?

Teaching/Learning/Content

- Which purposes?
- Which students?
- Which faculty?

38

12. INSTITUTION-WIDE COLLABORATION

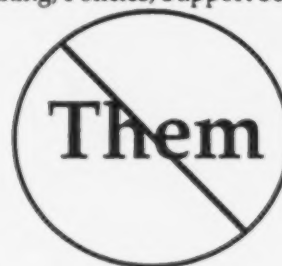
- No institution can afford *all* attractive options
- No individual faculty member can know/find *all* teaching options
- Develop Institution-Wide Collaboration to Improve Teaching and Learning.

39

How? Form Local TLT Roundtables!

DeFragmentation

Planning, Policies, Support Services



40

A Local TLT Roundtable -- GOALS

- Improve Teaching & Learning Widely/Deeply
- Via (Cost)Effective Integration of Information Technology

41

A Local TLT Roundtable -- GOALS (cont.)

Make Technology Serve
Institutional Mission,
Individual Values

42



Teaching, Learning, and Technology Roundtable (TLTR) Program

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A Local TLT Roundtable -- METHOD

- Inclusive, Collaborative
- High Influence,
Low Authority
 - Planning
 - Advice
 - Forum
 - Implementation

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AAHE TLTR GUIDELINES: INCLUSIVE CAMPUS PLANNING

- 2 Categories of Faculty
- 4+ Service Organizations
 - Computing, Library,
Faculty Development, Bookstore
- Chief Academic Officer
- Student Views Available
- Inter-Institutional Information Exchange
- Long-term Commitment

44

AAHE TLTR Approach (Cont.)

Understand, Respect
Local Culture
(& Local Politics)

45

AAHE TLT Local Roundtable



46

Sources, Resources
[Commercial]

Subscribe to LISTSERV
AAHESGIT
[4,000+ 3/25/96!]
Send message to

LISTPROC@LIST.CREN.NET

"SUBSCRIBE AAHESGIT
YOURFIRSTNAME
YOURLASTNAME"

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(TLTR) Program
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Check the AAHE (TLTR)
WWW Site

- <http://www.ido.gmu.edu/aahe/Welcome.html>
- Copy of Steve Gilbert's Recent Presentation Slides(?); Other AAHE Info; Other TLTR Info

Change Magazine

March/April 1996

AAHE Events

Regional TLTR Workshops

- Introductory (1/2 day)
- Start-Up (1.5 day) TEAMS
 - » Washington DC Area
 - » George Mason University
 - » May 3-4, 1996
- Contact Ellen Shortill
(202) 293 6440 ext. 38
SHORTILL@CLARK.NET

AAHE Events (cont.)

- 2nd Annual
TLTR Summer Institute
 - "Strategies for Change"
 - Scottsdale Princess - Scottsdale, Arizona
 - July 12-16, 1996
 - [Teams & Individuals]

TLTR Summer Institute (July 12-16, 1996 Scottsdale, AZ.) (cont.) TRACKS

- I. Institutional Planning, Resources, and Support Services
- II. Changing Faculty and Student Roles -- and the Curriculum
- III. Education, Technology, and the Human Spirit
- IV. Assessment, Evaluation, and Research

CONCLUSION: Nightmares, Visions, & Beyond

Nightmares

- Unlikely:
Video Zombies
[NO SCHOOLS,
COLLEGES]

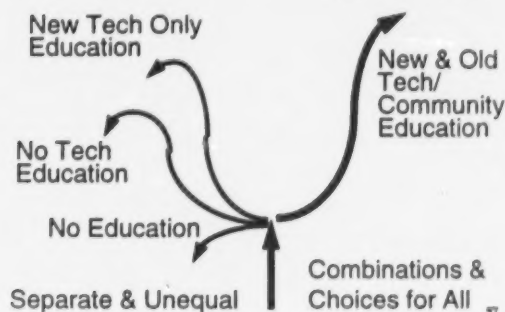
55

Nightmares

- Too Likely:
"Cutting Wedge"
-- Reed Hundt
[Read
Parable of the Sower
by Octavia Butler]

56

Info Tech: The Cutting Wedge?



57

A (Double? Triple?) Vision

Worth Working Toward

- Flexible Combination of Strategies and Services Supporting Education, Technology, and the Human Spirit
- "Wide" and "Deep"

58

A Vision Worth Working Toward (cont.)

- Excitement for Pioneers
- Comfortable Engagement for Mainstream
- [Respect for Laggards]

59

Biggest Vision: Putting It All Together

- *Collaboration* -- Horizontal
 - Across Functional Categories
 - Across Institutions
 - (TLTR)
- *Connection* -- Vertical
 - Teaching and Learning (Student Assistants)
 - Governors to Babies (Holding Babies)

60



Teaching, Learning, and Technology Roundtable (TLTR) Program

Steven W. Gilbert

(Only 4 more slides after this one!)

Please
Send
Evaluations/Suggestions

- Send EMail to:
ANTICO@CLARK.NET

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Our Challenge:

Use information technology
to improve education and
shape a future
that avoids these blunders.

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Additions:

- Technology without direction
- Connection without community
- Teaching without joy
- Learning without hope

65

Beyond a Campus Vision:

Mohandas Gandhi's

"Seven Blunders of the World"
that lead to violence

- "...the elder Gandhi kept his grandson close at hand and set aside an hour every day to be alone with the boy."

- The Christian Science Monitor 2/1/95 p. 14₆₂

7 Blunders

- Wealth without work
- Pleasure without conscience
- Knowledge without character
- Commerce without morality
- Science without humanity
- Worship without sacrifice
- Politics without principle
- Rights without responsibilities

[Arun Gandhi]

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Poster Sessions



Mid-South Instructional Technology Conference



Infotech Interactive: Increasing Student Participation using Multimedia

Prof. Anthony Q. Baxter
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(tony@cs.engr.uky.edu)

Abstract

Multimedia techniques allow one to present information using text, video, animations, and sound. Infotech Interactive is a multimedia product developed to enhance a computing concepts course. This paper lists the topics explored in this software. The formats used are discussed and several topic modules are described in more depth.

The greatest challenge in developing this software was to determine how to increase the level and modes of interactivity to actively engage students. This paper discusses how we provide meaningful user interactivity with various conceptual modules. In conclusion we give a summary of preliminary reviews and discuss possible improvements.

Infotech Interactive: Increasing Student Participation using Multimedia

Anthony Q. Baxter

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(tony@cs.engr.uky.edu)

Abstract

Multimedia techniques allow one to present a body of information using text, video, animations, and sound. Infotech Interactive¹ is a multimedia product developed to enhance a general computing concepts course. This paper gives the set of topics explored in this software. The general formats used in the several modules are discussed and several specific topic modules are described in more depth.

The greatest challenge in developing this software was to determine how to increase the level and modes of interactivity so as to actively engage the students. This paper discusses how we provide meaningful user interactivity with the various conceptual modules. In conclusion we give a brief summary of the preliminary reviews which academic users have provided and discuss possible improvements.

Introduction

In late Fall of 1994 Richard D. Irwin, Inc., The Human Element, Inc.², and I started work on an ill-defined project to "develop an interactive CD-Rom" to accompany a textbook³ for a computer concepts course. Richard D. Irwin, through Bill Bayer and Tom Casson, provided the funding and editorial review. The Human Element, through Adam Burton and a large support cast of artists and technicians, supplied graphics and implemented the modules. I supplied the textual material and we all defined the functionality of the modules. This paper describes the goals and design issues addressed in the project, highlights several of the modules, discusses the different types of interactivity used, and summarizes some of the initial response to this educational software.

Project Goals and Design Issues

We identified a collection of goals for this software.

- *The audience was to be students in an introductory computer concepts course.*

This mandated that the material be presented in a non-technical manner at a relatively introductory level. A fair characterization of the material is that it stresses *what* users employ computing tools for and *what* they are useful for more than showing the details of *how* they are implemented. As is seen by the topic list shown later in the paper, we selected mostly non-technical topics. Where detailed technical issues were involved we have attempted to address them in a conceptual manner not a technical manner.

- *The software was to accompany a text book but should be independent of a specific text.*

Although this is currently being distributed with a text³, the material is not dependent on that text for any specifics. Since we assume that students will have a text available we decided to keep the textual material to a minimum. With few exceptions all text is included directly on the screen with no paging or scrolling. A particular module is not a complete treatment of a topic. They are designed to give the user the opportunity to manipulate some of the concepts and ideas in each of these different areas.

- *Some additional information about terms used in the text was to be available.*

As textual material was to be kept short, there was not screen space available to completely define all terms used. Initial feedback by external reviewers indicated that this was a weakness. Thus, a glossary is provided to allow users to obtain ready definitions of terms. We incorporated the glossary from the

Williams³ text and supplemented it with all additional terms used in the CD-Rom.

- *The program is to present a simple, yet flexible user interface.*

In order to allow users maximum flexibility we decided to offer perpetual navigation. Users can select any module at any time. A typical screen layout is shown below. The modules are selected via the menu at the left. The introductory section of a module is entered when it is selected. Additional information when available is indicated by a red "I" or a yellow "INFO" button. A prompt bar gives instructions about what is expected next and is context sensitive. The glossary can be invoked at any time.

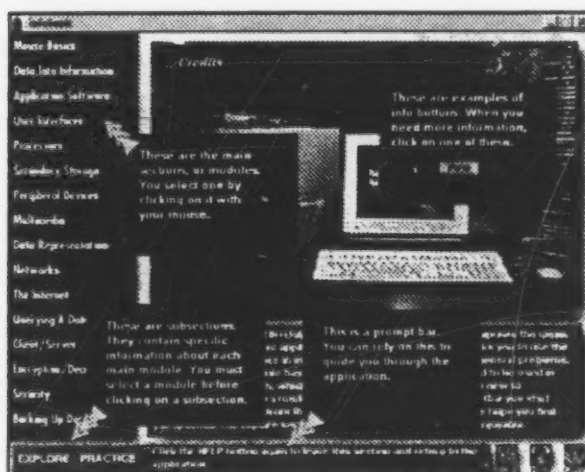


Fig. 1 - General Screen Layout

- *All modules will use a consistent learning model.*

All modules (excepting the Mouse Basics Module) consist of three sections. The **Introduction** introduces the module and defines any needed terms. For some modules this is relatively brief. For others, such as the peripheral devices or data representations modules, this is extensive detailing a user-level view of the topic. The **Explore** section, typically, contains the most interaction. In this section users are allowed

to manipulate the ideas that were presented in the introduction. Students are permitted to interact with the ideas at their own pace until they feel confident enough to be quizzed on the material. The **Practice** section is used for assessment. Users are presented scenarios in which they must use the ideas seen in the previous sections to solve a small problem or determine a correct answer. We will discuss several specific examples later.

- *The product should engage the users through meaningful interactions.*

This was one of our major design issues. Where and how should we interact with the users. Some places were obvious, we had to have selectable menus, information buttons, and page turning mechanisms. The Exploration and Practice sections received the most attention.

In the exploration section we developed a number of scenarios in which users could explore issues in an unstructured manner, jumping from topic to topic at their discretion. Many topics allow users to select parameters and see the effect of their choices immediately.

The practice sections also make extensive use of similar interactivity. Most questions are in the form of "what software tools would you use to ...", or "select the appropriate parameters to best ...", or "what format would be best to describe" We ask questions for which there is usually not one correct answer. This allows us to conduct a dialog with the user as he refines his answer investigating strengths and weaknesses of different aspects of the answer. We have found that users will intentionally give incorrect answers just to see the interaction.

Module Topics

We initially identified 25-30 possible modules. Budget and time constraints reduced that number to 16 which were actually developed. They were:

1. Mouse Basics - *introduction to using Windows and a mouse.*
2. Data into Information - *data presentation; a collection of different charts and reports.*
3. Applications Software - *a survey of popular types of software including: spreadsheets, word-processing, databases, communications, and others.*
4. User Interfaces - *a tour of command line, menu-driven, and graphical user interfaces.*
5. Processors - *a quick look at data and instruction storage and the basic instruction cycle.*
6. Secondary Storage - *disk characteristics, directories, and file storage.*
7. Peripheral Devices - *a look at what different devices do, how they are used, and how they work.*
8. Multimedia - *what it is and how it is used.*
9. Data Representation - *how elementary data items, simple data structures, and databases are represented in a typical computer system.*
10. Networks - *characteristics and types of networks.*
11. The Internet - *what it is, how it works, and how to find information using a browser.*
12. Querying a Database - *using a relational database and extracting data from tables.*
13. Client/Server - *what it is and comparing file servers with database servers.*
14. Encryption/Decryption - *data security through simple encodings.*
15. Security - *a scavenger hunt for security flaws and a look at tools to increase computer security.*
16. Backing Up Data - *construct a backup plan using incremental and full backups to a set of tapes*

Sample Modules

In order to illustrate the flavor of these modules we will discuss the Querying a Database and the Data Representation modules in more detail. Querying a Database module is a good example of the flexibility designed into the Explore section.

Shown below, in Fig. 2, is one of the exploration screens in which the user can formulate queries by selecting criteria based on GPA and Major. Once a criterion is selected those items which would be selected using that criterion are highlighted in the table. Illogical criteria, such as all students who have a major of "CS" and a major of "Econ" a student can not have two majors. Similarly, selecting both "GPA $\geq$ 3.0" and "GPA $\geq$ 3.5" will give feedback indicating that this selection is equivalent to just the simpler criteria "GPA $\geq$ 3.5".

STUDENT	ID	NAME	MAJOR	GPA
	123	Susan	CS	3.75
	479	Joseph	Econ	2.33
	342	Michael	CS	3.00
	288	Amanda	CS	3.00

GPA ☐ ≥ 3.0 ☒ ≥ 3.5

MAJOR ☐ "CS" ☒ "Econ"

The highlighted rows are determined by the criteria that you have selected.

Click on other criteria or on the 2 Tables button for more examples.

Fig. 2 - Querying a Database - Explore - 1 Table

Since queries on a single table are somewhat simplistic we introduce a second table of courses and grades. This addition raised a technical question; namely, how do we discuss the database join operation. We could have discussed Cartesian products, natural joins, equi-joins, inner joins, and outer joins with the predictable result of totally confusing the intended audience. We chose to concentrate of the portion of the problem that would be visible to a naive database user using a commercial software product which would require that the user specify the join condition. Fig. 3 shows as a query to obtain all "CS" majors having a "GPA $\geq$ 3.0" with courses in which they received a

grade of "B." The users select the criteria and then select the Execute button to invokes a query and shows the results at the bottom.

The "Join by ID" selection toggles between a Cartesian cross product and an equijoin of the two tables. We don't burden the users with these technical terms, but rather allow them to manipulate the data and discover their characteristics informally.

1 Table 2 Tables

STUDENT

ID	NAME	MAJOR	GPA
123	Steven	CS	3.75
342	Joseph	Econ	3.52
478	Michael	CS	3.48
298	Armando	CS	3.98

MAJOR: ☐ CS ☐ Econ

GRADE: ☐ A ☐ B ☐ A or B

☐ Join by ID

The highlighted rows are determined by the criteria that you have selected. Click on another criteria.

Execute

COURSE

ID	COURSE	GRADE
298	CS-101	A
342	CS-101	C
478	Phy-100	F
298	Econ-101	A
478	Phy-100	B
123	Math-112	A
123	Econ-101	A
342	Econ-101	A
123	Math-112	B
123	CS-101	A
298	Acc-101	A
342	Math-112	B

ID	NAME	MAJOR	GPA	ID	COURSE	GRADE
123	Steven	CS	3.75	123	ACC-101	B
342	Michael	CS	3.48	342	Math-112	B
342	Michael	CS	3.48	342	Math-114	B

Fig. 3 - Querying a Database - Explore - 2 Tables

The Practice portion of the Querying a Database module requires that students use these same tables to formulate queries which will answer specific information needs. For example, one of the questions is: "The College of Business and Economics wants a list of all 'Econ' students names and course in which they received either an 'A' or a 'B'." Wrong responses result in gentle warnings and hints. The correct response results in a Bravo!

Here, and in most other modules, there are often several answers which will suffice to correctly answer a question. In the query above one could return the name, course, and GPA for Econ students with A or B. This correctly answers the question and the student needs to know that. The response, as seen below in Fig. 4, would tell them that additional, unrequested, data is being returned but that it is essentially a correct answer. Were the selection

criterion incorrect the feedback would indicate that the solution was incorrect.

We have also used the practice section to introduce some additional information. Again using the Database module as an example the users are instructed to select only certain columns for their results (the database projection operation). A syntactically correct SQL language query is generated and displayed as they select the criteria to be used in formulating their answer. This hopefully, gives the readers some exposure to the topic of query languages without requiring them to become mired in the details of learning a computer language.

STUDENT

ID	NAME	MAJOR	GPA
123	Steven	CS	3.75
342	Joseph	Econ	3.52
478	Michael	CS	3.48
298	Armando	CS	3.98

MAJOR: ☐ CS ☐ Econ

GRADE: ☐ A ☐ B ☐ A or B

☐ Join by ID

(2) The College of Business and Economics wants a list of all 'Econ' students names and course in which they received grades of either 'A' or 'B'.

Next Question Execute

COURSE

ID	COURSE	GRADE
298	CS-101	A
342	CS-101	C
478	Phy-100	F
298	Econ-101	A
478	Phy-100	B
298	Econ-102	A
478	Math-112	B
123	Econ-101	A
342	Econ-101	A
342	Math-113	B
123	Acc-101	B
123	Math-113	A
123	CS-101	A
298	Acc-101	A
342	Math-114	B

SELECT s.name, course, grade FROM Student as s, Grades as g WHERE s.major="Econ" and (s.grade="A" or s.grade="B") and s.id=g.id and s.id=g.id

It isn't wrong to select extra fields, but only the Course and Name are really required. The SQL query shown will answer the question and return a table with data.

Fig. 4 - Querying a Database - Practice

The Data Representation module shows how different data types are used and how they are represented. We show Boolean data, characters, integers, real numbers, records, hierarchical databases, networked databases, and relational databases. The Introduction discussed and illustrates how a casual user would use each of these. The Explore section shows how each would be represented; namely, bits and bytes for the elementary data items and structures for the more complex items. This is accomplished through a combination of animations and user selections or input with the feedback being how that particular item is represented.

The Practice section became a challenge. We wanted to insure that the users could determine how a particular object was represented or what an object represents. We did **not** want, however, to require that the user be very proficient. We had originally decided to avoid the traditional multiple choice question, but it seemed an obvious choice for questions of this type. This became an opportunity to make even the ubiquitous multiple choice question can more interesting with interactivity. We ask questions in this format which it are really unreasonable for the students to be able to answer given the level of their involvement with computing. For example, as seen below in Fig. 5, is a question that asks them to give the internal representation of the decimal integer 51. Initially there is a relatively meaningless graphic on the screen along with the question. If they determine that they need assistance with the details of a question they can select the "Help Me" button. This causes the appropriate Explore section to be invoked which then can be used to extract the needed details. For the question shown here they can press the red buttons until they determine the correct answer.

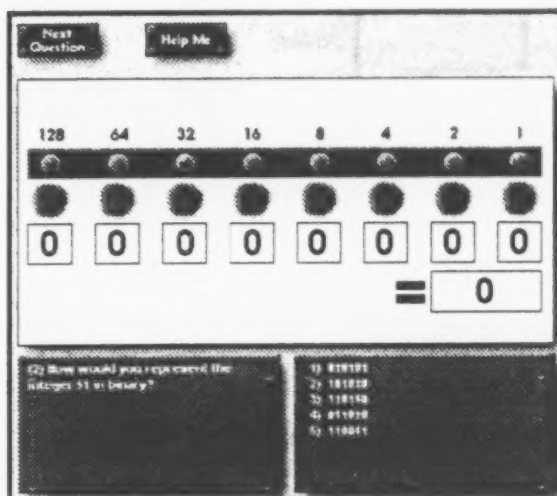


Fig. 5 - Data representation - Practice

User Interactivity

We believed that the manners in which users interacted with this software was critical. Multimedia material without user interactions will not engage the user. We purposefully varied the types of interactions between pointing to icons or objects, dragging icons, and entering text from the keyboard.

We also have made extensive use of animations to illustrate concepts. Where possible we have allowed user input drive the details of the animations. For example, in the Networks module the users configure the network and the configuration dictates the animation. In the secondary storage module the user selects where on a disk drive data is to be stored and the animation moves the disk and arm accordingly.

We have used sound and video to a lesser extent.

Conclusions

Infotech Interactive has been distributed since the summer of 1995 and we have conducted an extensive post-production review of the product. As with any review the results were not unanimous; but several themes were evident.

- *more interactions*

The interactivity was well received and its variety was noted. A common theme was the desire to increase the amount of interactivity. Where we allowed several paths through a module the reviewers asked for dozens. Where we had a small number of practice questions, more were desired.

- *more glitz*

In developing Infotech Interactive we had purposefully avoided the gratuitous use of gaudy colors, audio feedback, and flip user feedback. The

reviewers indicated that we were too conservative in our use color, sound, and text.

- *less text, cleaner text, more text*

Here we got mixed responses. Many of the reviewers felt that the text was too sketchy and that we should include a complete, text-like, discussion of each topic. This group wanted the CD to be a substitute for a text. A similar number of reviewers felt that we should reduce the amount of text even further and make more of it optional. A common complaint was that the text was somewhat hard to read and would be better were it presented in a web-like text browsing window separated from the interactivity screen. This would give users the ability to resize text windows and select any desired font.

- *more audio and voice overs*

Several reviewers suggested that we add a narration of the existing text. we are considering this suggestion. A possible scenario would be to narrate the basic discussion of each topic (or module) and in addition to have hyperlinked text with links to more detailed topic coverage.

- *more on www*

All reviewers wanted more, more, more about the internet and the world wide web. I hope the we can remedy this in several ways in future releases. First we should use a web-like search engine to drive the application. This gives users an intuitive look at the web without having to be on the web. The world

wide web module will be expanded in the next release. Secondly, I would like to consider adding web software to Infotech Interactive.

- *we are "on target"*

Generally, the reviewers felt that this was a worthwhile collection of learning exercises which targeted the correct population and, when used, added academic value to their course.

Based on this feedback from reviewers and other responses from users, we plan to incorporate these suggestions into a new version of Infotech Interactive to appear later this year.

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Rhodes College and Opera Memphis Web Project

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Abstract:

The Rhodes College History of Opera class collaborated with Opera Memphis to create a documentary on regional opera production, to present online information about Opera Memphis, and to construct a class home page to be used as a repository for examples of creative writing. The project required students to work in teams and to publish their findings on the Web. It resulted in students' gaining experience with the production of an opera. It also enabled them to develop technical skills that can be applied across academic disciplines.

Overture

In recent years a great deal has been written about the need to revise the way college classes are being taught. In an effort to provide some alternatives to the traditional lecture format, educators have looked at methods that involve more active participation by students, working in teams, on projects that take them outside of the classroom. At the same time, the of exploring the resources of the Internet has become a part of daily life for almost everyone on college campuses today. The interactivity provided by the Internet and, more recently, that part of it known as the Web, has given educators a powerful new tool that enables them to connect class work to the outside world in some very concrete ways.

A method of teaching that enables students to experience the subject matter is particularly desirable in fine arts courses. Reading about musical performances must be supplemented by more tangible experiences. In the case of a History of Opera course, involvement with actual productions is ideal.

Act I

In the spring of 1995, Rhodes College and Opera Memphis began collaborating on a project that brought some of the benefits of the Internet to both institutions. For several years, the Music Department at Rhodes has offered a History of Opera course. As part of the course, students have attended productions of Opera Memphis. In the past, students have been limited to observation. However, after teaching this course for several years, I felt that the experience would be improved if students were able to watch an opera being built from the very beginning. This would include attending rehearsals, interviewing singers and technicians, as well as talking with the business manger, the president of the Opera Board, the advertisers and others who had a part in mounting the production. At the end of this process they would compile their work into a unified class documentary. The advent of HTML and the easy creation of Web pages provided a perfect method for publishing the final product.

In June, 1995, I presented this idea to Michael Ching, Artistic Director of Opera Memphis. We constructed a plan whereby the History of Opera students would create a documentary called "The Making of *Rigoletto*" after the company's October, 1995 production of the Verdi opera. In the spring of 1996 another project would be created about the world premiere of Mike Reid's opera *Different Fields*. This new work was part of a collaboration between Opera Memphis and the Metropolitan Opera Guild. The opera, which deals with corruption in professional football, is designed to appeal to a young audience. It seemed logical that exposure on the Internet might be one effective way to advertise its performances.

In addition to creating the pages about *Rigoletto* and *Different Fields*, we decided to create an official home page for Opera Memphis to be run from the music department web server at Rhodes. This page would be maintained there until Opera Memphis set up its own server. It would contain information about the company's history, the current season, ticket prices, and a collection of production photographs from recent seasons. Members of the class would aid in design and creation of this page. A survey of opera companies with online home pages showed that, in addition to the major houses such as the Metropolitan and La Scala, many regional opera companies also had a presence on the Web. Opera Memphis has a distinguished history and is in its 40th season. It was clearly to its advantage to join this list of important opera companies on the Web.

Finally, I constructed a Music 121: History of Opera home page to be a repository of materials relative to the class. It contains the class description, the syllabus, and a listing of important opera resources elsewhere on the Web. Primarily, however, it serves as a site for the publication of essays on opera written by class members.

Act II

The eighteen students who enrolled in the History of Opera class in the fall semester of 1995 had limited experience with the Internet and no experience in the creation of Web pages. None of them had ever been involved with opera production. Therefore, they came as complete novices on all fronts. In the first three weeks of class they became comfortable exploring the Web and exchanging documents over the campus file server. They also used multimedia opera projects created with Digital Chisel authoring software.

After working with them for the first few weeks, I made assessments about which tasks were appropriate for which students. I explained the concept and made

suggestions about how duties should be divided. However, they made the final decision about how they wanted to participate. The major areas covered were:

- **Music Criticism:** One student interviewed the music critic on the local paper to see how he went about evaluating a performance. Happily, the critic was so interested in the class project that he wrote an article about it for his newspaper, *The Commercial Appeal*.
- **Interviews with Artists:** Several students interviewed singers, chorus members, and other performers to find out what is required to be a professional performer. The interviews were done during breaks at the rehearsals.
- **Interviews with Producers:** Several of the interviews were with the people responsible for financing and producing the opera. The interviews were conducted over the telephone or at the offices of the various business people.
- **Performance:** One student agreed to be a member of the chorus. This involved two weeks of rehearsal and large commitment of time and energy.
- **Photography:** One student attended several rehearsals and the performance in order to photograph the building of the work. We scanned her photographs and inserted them into the appropriate locations.
- **Multimedia Quizzes:** Three students learned the basics of creating interactive tests using Digital Chisel software. They created two multiple choice quizzes about the history of *Rigoletto*. These products were compressed using Stuffit Deluxe and imbedded in the home page.

Act III

The class did most of their interviews and research in the two weeks preceding the performance. They attended the performance as a group, very well versed in information about the opera itself as well as knowledge of this particular production. In the days following they submitted electronic copies of their reports. In some cases their articles contained names and terms that could be linked to other locations on the Web. They provided a listing of these URLs with their paper. When all the information was collected I constructed the documentary. However, students were involved in decisions about design, layout,

and the choice of graphics to be used. The final product was online within a month after the project started.

After the *Rigoletto* project was finished students continued to use the class home page to publish papers they wrote on comparisons of *Don Giovanni* and *Carmen*, comparisons of the Bayreuth and the Metropolitan productions of *Der Ring des Nibelungen*, and a finally set of reviews of several 20th century operas. Each paper contains a mailto function that encourages reader reaction to their work.

What the Critics Said

"The Making of *Rigoletto*" documentary, the Opera Memphis Home Page, and the Music 121: History of Opera home page required a significant amount of work for both professor and students. The question must be asked if the extra time and effort was worth it. The following observations of the process may be helpful in evaluating its effectiveness:

- Members of the class worked as a team and interacted with each other in a more meaningful way than typically occurs in a lecture format class. It was virtually impossible for a member of the class to chose to be passive and invisible.
- Students began to perceive opera as engaging and entertaining, not simply as a relic from the past.
- Students learned to appreciate how difficult it is for arts organizations to produce the highest possible standard of work and at the same time live within limited budgets.
- Students were very aware that their writing was being read by a worldwide audience. Within the first month, the project had been viewed by nearly a eight hundred visitors.
- The class seemed to have a pride of ownership in their work. As the semester ended and the pages continued to receive hundreds of visits, it became apparent that their work had a continued existence, unlike the usual research paper.

From this experience I concluded that a project of this type is valuable in the teaching of music history. It serves as an enhancement to the more traditional

ways of teaching the material. It provides students with skills and ideas that they can apply to other situations. The team effort element requires them to assume responsibility and to be accountable to both the professor and their peers.

Making projects blend seamlessly into the rest of the class work is a significant challenge. However, as these projects become more common, the challenge will be met. At present, students still have to cope with new technologies and even with the basic concepts of computer networking. The ongoing challenge is to increase the inherent value of the class work so it is never overshadowed by the vehicle that carries it forward.

Mid-South Instructional Technology Conference

Summary of Conference Evaluations

• The enrollment at my institution is:

Under 2,000	18%
2,000-7,999	34%
8,000-17,999	43%
18,000+	5%

• My institution is classified as:

Comprehensive	46%
Research	3%
Liberal Arts	25%
Two-year	23%
Special	0%
Other	3%

• Rate the following conference activities in terms of their value to you:

Keynote address, Ben Shneiderman	
Valuable	64%
Somewhat Valuable	30%
Not Valuable	6%

Featured address, Steven Gilbert	
Valuable	69%
Somewhat Valuable	31%
Not Valuable	0%

Track sessions	
Valuable	70%
Somewhat Valuable	30%
Not Valuable	0%

AAHE TLTR workshop	
Valuable	89%
Somewhat Valuable	11%
Not Valuable	0%

Hands-on workshops	
Valuable	62%
Somewhat Valuable	33%
Not Valuable	5%

Electronic poster sessions

Valuable	70%
Somewhat Valuable	30%
Not Valuable	0%

Moderated discussion groups

Valuable	73%
Somewhat Valuable	27%
Not Valuable	0%

• What made you decide to attend the Mid-South Instructional Technology Conference?

- 1 - Program content
- 2 - Professional development
- 3 - Conference location
- 4 - Opportunity to network with colleagues
- 5 - Conference dates
- 6 - Featured speakers
- 7 - Peer recommendation

• How useful did you find the conference Web site?

Useful	62%
Somewhat useful	31%
Not useful	7%

• How useful were the conference materials?

Useful	81%
Somewhat useful	17%
Not useful	2%

• Did you learn anything at the conference that may affect the way you do things at your institution?

Yes	95%
No	5%